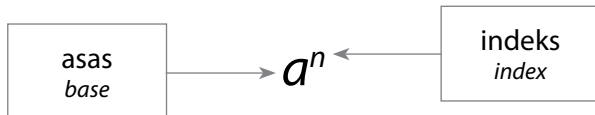


JAWAPAN

BAB
1

Indeks Indices

1.



2. (a) $0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 = 0.5^6$
 (b) $(-h) \times (-h) \times (-h) \times (-h) \times (-h) = (-h)^5$
 (c) $7 \times 7 \times 7 \times 7 \times 7 = 7^5$
 (d) $(-9) \times (-9) \times (-9) \times (-9) \times (-9) \times (-9) = (-9)^6$
 (e) $\frac{3}{5} \times \frac{3}{5} \times \frac{3}{5} \times \frac{3}{5} = \left(\frac{3}{5}\right)^4$
 (f) $(-0.6) \times (-0.6) \times (-0.6) = (-0.6)^3$
 (g) $2n \times 2n \times 2n \times 2n = (2n)^4$

Indeks/ Eksponen pada suatu nombor yang ditulis dalam bentuk indeks menunjukkan bilangan kali nombor itu didarab secara berulang.

The index/ exponent of a number written in index form indicates the number of times the number is multiplied repeatedly.

3. (a) $6^9 = 6 \times 6 \times 6 \times 6 \times 6 \times 6 \times 6 \times 6 \times 6$
 (b) $1.4^4 = 1.4 \times 1.4 \times 1.4 \times 1.4$
 (c) $\left(-\frac{1}{7}\right)^5 = \left(-\frac{1}{7}\right) \times \left(-\frac{1}{7}\right) \times \left(-\frac{1}{7}\right) \times \left(-\frac{1}{7}\right) \times \left(-\frac{1}{7}\right)$
 (d) $m^8 = m \times m \times m \times m \times m \times m \times m \times m$
 (e) $\left(2\frac{1}{8}\right)^6 = 2\frac{1}{8} \times 2\frac{1}{8} \times 2\frac{1}{8} \times 2\frac{1}{8} \times 2\frac{1}{8} \times 2\frac{1}{8}$
 (f) $(-9p)^3 = (-9p) \times (-9p) \times (-9p)$

4. (a) $256 = 4 \times 4 \times 4 \times 4 = 4^4$

$$\begin{array}{r} 4 \overline{) 256} \\ 4 \overline{) 64} \\ 4 \overline{) 16} \\ 4 \overline{) 4} \\ \hline 1 \end{array}$$

- (b) $32 = 2 \times 2 \times 2 \times 2 \times 2 = 2^5$

$$\begin{array}{r} 2 \overline{) 32} \\ 2 \overline{) 16} \\ 2 \overline{) 8} \\ 2 \overline{) 4} \\ 2 \overline{) 2} \\ \hline 1 \end{array}$$

- (c) $625 = (-5) \times (-5) \times (-5) \times (-5) = (-5)^4$

$$\begin{array}{r} -5 \overline{) +625} \\ -5 \overline{) -125} \\ -5 \overline{) +25} \\ -5 \overline{) -5} \\ \hline +1 \end{array}$$

- (d) $\frac{64}{125} = \frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} = \left(\frac{4}{5}\right)^3$

$$\begin{array}{r} 4 \overline{) 64} \\ 4 \overline{) 16} \\ 4 \overline{) 4} \\ \hline 1 \end{array} \quad \begin{array}{r} 5 \overline{) 125} \\ 5 \overline{) 25} \\ 5 \overline{) 5} \\ \hline 1 \end{array}$$

5. (a) $(-3)^5 = (-3) \times (-3) \times (-3) \times (-3) \times (-3) = -243$

- (b) $\left(\frac{4}{5}\right)^3 = \frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} = \frac{64}{125}$

- (c) $0.6^4 = 0.6 \times 0.6 \times 0.6 \times 0.6 = 0.1296$

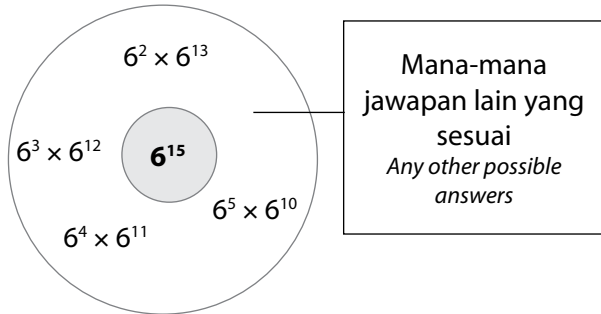
- (d) $\left(1\frac{4}{7}\right)^2 = \left(\frac{11}{7}\right)^2 = \frac{11}{7} \times \frac{11}{7} = \frac{121}{49}$

6. (a) $(3 \times 3) \times (3 \times 3 \times 3 \times 3) = 3^{\boxed{2}} \times 3^{\boxed{4}}$
 $3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3^{\boxed{6}}$

(b) $(p \times p \times p \times p) \times (p \times p \times p) = p^{\boxed{4}} \times p^{\boxed{3}}$
 $p \times p \times p \times p \times p \times p \times p = p^{\boxed{7}}$

Secara generalisasi / By generalisation, $a^m \times a^n = a^{\boxed{m+n}}$

7.



8. (a) $(-0.2)^5 \times (-0.2)^2$
 $= (-0.2)^{5+2}$
 $= (-0.2)^7$

(b) $p^6 \times p^{12}$
 $= p^{6+12}$
 $= p^{18}$

(c) $9 \times 9^3 \times 9^{10}$
 $= 9^{1+3+10}$
 $= 9^{14}$

(d) $2x^3 \times x^7 \times 9x^5$
 $= (2 \times 9) \times (x^3 \times x^7 \times x^5)$
 $= 18x^{3+7+5}$
 $= 18x^{15}$

(e) $y^3 \times 2y \times 3y^4$
 $= (2 \times 3) \times (y^3 \times y \times y^4)$
 $= 6y^{3+1+4}$
 $= 6y^8$

(f) $-\frac{1}{4}j^2 \times \left(-\frac{1}{3}\right)^4 \times 24j^7$
 $= \left[-\frac{1}{4} \times \left(-\frac{1}{3}\right) \times 24\right] \times (j^2 \times j^4 \times j^7)$
 $= 2j^{2+4+7}$
 $= 2j^{13}$

9. (a) $3^6 \times 5^2 \times 3^4 \times 5^3$
 $= 3^6 \times 3^4 \times 5^2 \times 5^3$
 $= 3^{6+4} \times 5^{2+3}$
 $= 3^{10} \times 5^5$

(b) $(-0.7)^4 \times 6^2 \times (-0.7)^5 \times 6^6$
 $= (-0.7)^4 \times (-0.7)^5 \times 6^2 \times 6^6$
 $= (-0.7)^{4+5} \times 6^{2+6}$
 $= (-0.7)^9 \times 6^8$

(c) $-u^2 \times 3v^3 \times 5v^3 \times u^4$
 $= (-1 \times 3 \times 5) \times (u^2 \times u^4 \times v^3 \times v^3)$
 $= -15u^{2+4}v^{3+3}$
 $= -15u^6v^6$

10. (a) $\frac{2 \times 2 \times 2 \times 2 \times 2 \times 2}{2 \times 2 \times 2} = \frac{2^{\boxed{6}}}{2^{\boxed{3}}}$

$\frac{2 \times 2 \times 2 \times 2 \times 2 \times 2}{2 \times 2 \times 2} = 2^{\boxed{3}}$

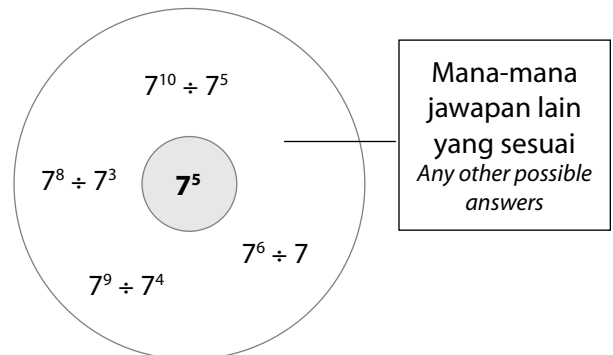
(b) $p^8 \div p^4 = \frac{p^{\boxed{8}}}{p^{\boxed{4}}}$

$\frac{p \times p \times p \times p \times p \times p \times p \times p}{p \times p \times p \times p} = p^{\boxed{4}}$

Secara generalisasi
 By generalisation,

$a^m \div a^n = a^{\boxed{m-n}}$

11.



12. (a) $8^6 \div 8^2 = 8^{6-2}$
 $= 8^4$

(b) $\frac{3^{18}}{3^9} = 3^{18-9}$
 $= 3^9$

(c) $x^{16} \div x^4 \div x^2 = x^{16-4-2}$
 $= x^{10}$

$$\begin{aligned} \text{(d)} \quad 14y^7 \div 2y &= \frac{14y^7}{2y} \\ &= 7y^{7-1} \\ &= 7y^6 \end{aligned}$$

$$\begin{aligned} \text{(e)} \quad 36k^7 \div 6k^2 \div k^2 &= \frac{36k^7}{6k^2} \div k^2 \\ &= 6k^{7-2} \div k^2 \\ &= 6k^5 \div k^2 \\ &= 6k^{5-2} \\ &= 6k^3 \end{aligned}$$

$$\begin{aligned} \text{(f)} \quad -25m^{10} \div 5m^2 \div 5m^3 &= \frac{-25m^{10}}{5m^2} \div 5m^3 \\ &= -5m^{10-2} \div 5m^3 \\ &= -5m^8 \div 5m^3 \\ &= -1m^{8-3} \\ &= -m^5 \end{aligned}$$

$$\begin{aligned} \text{(g)} \quad x^9y^{11} \div x^3y^9 &= x^{9-3}y^{11-9} \\ &= x^6y^2 \end{aligned}$$

$$\begin{aligned} \text{(h)} \quad 35g^4h^8 \div 5g^2h^4 &= \frac{35}{5}g^{4-2}h^{8-4} \\ &= 7g^2h^4 \end{aligned}$$

$$\begin{aligned} \text{(i)} \quad \frac{121m^7n^6}{11mn^5} &= 11m^{7-1}n^{6-5} \\ &= 11m^6n \end{aligned}$$

$$\text{13. (a)} \quad 5^{\boxed{7}} \div 5^2 \div 5^4 = 5$$

$$\text{(b)} \quad a^{\boxed{5}}b^4 \div a^4b^{\boxed{2}} = ab^2$$

$$\text{(c)} \quad \frac{a^{12}b^5 \times a^{\boxed{6}}b^2}{a^9b} = a^9b^{\boxed{6}}$$

$$\text{(d)} \quad \frac{56a^9b \times a^3b^{\boxed{2}}}{\boxed{8}a^3b} = 7a^{\boxed{9}}b^2$$

$$\text{14.} \quad \frac{8^x \times 3^y}{8^3 \times 3^6} = 8 \times 3$$

$$\begin{array}{lll} 8^{x-3} = 8^1 & 3^{y-6} = 3^1 & \text{Maka/ Hence,} \\ x-3 = 1 & y-6 = 1 & x+y = 4+7 \\ x = 4 & y = 7 & = 11 \end{array}$$

$$\text{15. (a)} \quad 4^9 \times 4^9 \times 4^9 \times 4^9 \times 4^9 = (4^9)^{\boxed{5}}$$

$$4^{9+9+9+9+9} = 4^{\boxed{45}}$$

$$\begin{aligned} \text{(b)} \quad 2^p \times 2^p \times 2^p \times 2^p \times 2^p \times 2^p \times 2^p &= (2^p)^{\boxed{7}} \\ 2^{p+p+p+p+p+p+p} &= 2^{\boxed{7p}} \end{aligned}$$

Secara generalisasi,

By generalisation,

$$(a^m)^n = a^{\boxed{mn}}$$

$$\text{16. (a)} \quad (9^2)^8 = 9^{2 \times 8} = 9^{16}$$

$$\text{(b)} \quad (k^3)^6 = k^{3 \times 6} = k^{18}$$

$$\text{(c)} \quad (x^{11})^2 = x^{11 \times 2} = x^{22}$$

$$\text{(d)} \quad (2y^3)^4 = 2^{1 \times 4} \times y^{3 \times 4} = 16y^{12}$$

$$\text{(e)} \quad [(-5)^2]^3 = (-5)^{2 \times 3} = (-5)^6$$

$$\text{(f)} \quad [(-j)^5]^5 = (-j)^{5 \times 5} = (-j)^{25}$$

$$\begin{aligned} \text{17. (a)} \quad (9^5 \times 8^3 \times 4^6)^2 &= 9^{5 \times 2} \times 8^{3 \times 2} \times 4^{6 \times 2} \\ &= 9^{10} \times 8^6 \times 4^{12} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad (2j^2kl^6)^5 &= 2^5 \times j^{2 \times 5} \times k^5 \times l^{6 \times 5} \\ &= 2^5 j^{10} k^5 l^{30} \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad (7m^0n)^4 &= 7^4 m^0 n^4 \\ &= 7^4 (1) n^4 \\ &= 7^4 n^4 \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad \left(\frac{2^3}{5^2}\right)^4 &= \frac{2^{3 \times 4}}{5^{2 \times 4}} \\ &= \frac{2^{12}}{5^8} \end{aligned}$$

$$\begin{aligned} \text{(e)} \quad \left(\frac{x^7}{y}\right)^6 &= \frac{x^{7 \times 6}}{y^{1 \times 6}} \\ &= \frac{x^{42}}{y^6} \end{aligned}$$

$$\begin{aligned} \text{(f)} \quad \left(\frac{4p^3}{3q^2}\right)^5 &= \frac{4^5 \times p^{3 \times 5}}{3^5 \times q^{2 \times 5}} \\ &= \frac{4^5 p^{15}}{3^5 q^{10}} \end{aligned}$$

$$\begin{aligned} \text{18. (a) (i)} \quad \frac{2 \times 2 \times 2 \times 2}{2 \times 2 \times 2 \times 2} &= \boxed{1} \\ \frac{2^4}{2^4} &= 2^{\boxed{4-4}} = 2^{\boxed{0}} \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad \frac{p \times p \times p}{p \times p \times p} &= \boxed{1} \\ \frac{p^3}{p^3} &= p^{\boxed{3-3}} = p^{\boxed{0}} \end{aligned}$$

Secara generalisasi,
By generalisation,

$$a^0 = \boxed{1}$$

(b) (i) $\frac{2 \times 2 \times 2 \times 2}{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2} = \boxed{\frac{1}{2^3}}$

$$\frac{2^4}{2^7} = 2^{\boxed{4-7}} = 2^{\boxed{-3}}$$

(ii) $\frac{p \times p \times p}{p \times p \times p \times p \times p} = \boxed{\frac{1}{p^2}}$

$$\frac{p^3}{p^5} = p^{\boxed{3-5}} = p^{\boxed{-2}}$$

Secara generalisasi,
By generalisation,

$$a^{-n} = \boxed{\frac{1}{a^n}}; a \neq 0$$

19. (b) $2^0 = 1$

(c) $p^0 = 1$

20.

$$\begin{array}{cccccccc} 4^{-1} & \triangle_{as} & 6^{-2} & \triangle_{as} & 9^{-5} & \triangle_{as} & 10^{-6} & \triangle_{as} & p^{-7} & \triangle_{as} & (2x)^{-3} & \triangle_{as} & (jk)^{-6} \\ \boxed{\frac{1}{4}} & & \boxed{\frac{1}{6^2}} & & \boxed{\frac{1}{9^5}} & & \boxed{\frac{1}{10^6}} & & \boxed{\frac{1}{p^7}} & & \boxed{\frac{1}{(2x)^3}} & & \boxed{\frac{1}{(jk)^6}} \end{array}$$

21. (a) $\left(\frac{3}{5}\right)^{-1} = \frac{5}{3}$

(b) $\frac{1}{6^{-3}} = 6^3$

(c) $\frac{1}{x^{-5}} = x^5$

(d) $\left(\frac{4}{7}\right)^{-2} = \left(\frac{7}{4}\right)^2$

(e) $\frac{2}{9}y^{-4} = \frac{2}{9y^4}$

22. (a) $\left(\frac{1}{4}\right)^6 = 4^{-6}$

(b) $3^2 = \frac{1}{3^{-2}}$

(c) $\frac{5}{9} = \left(\frac{9}{5}\right)^{-1}$

(d) $(-7)^5 = \frac{1}{(-7)^{-5}}$

(e) $\left(\frac{j}{k}\right)^6 = \left(\frac{k}{j}\right)^{-6}$

23. (a) $x^2 = 25$ $\sqrt{x^2} = \sqrt{5^2} \iff (x^2)^{\frac{1}{2}} = (5^2)^{\frac{1}{2}}$
 $x = 5$ $x^1 = 5^1$

(b) $x^3 = 27$ $\sqrt[3]{x^3} = \sqrt[3]{3^3} \iff (x^3)^{\frac{1}{3}} = (3^3)^{\frac{1}{3}}$
 $x = 3$ $x^1 = 3^1$

Secara generalisasi, / By generalisation, $\sqrt[n]{a} = a^{\frac{1}{n}}$

24.

$$\begin{array}{cccccccc} 25^{\frac{1}{2}} & \triangle_{as} & 64^{\frac{1}{3}} & \triangle_{as} & 32^{\frac{1}{5}} & \triangle_{as} & 256^{\frac{1}{4}} & \triangle_{as} & h^{\frac{1}{7}} & \triangle_{as} & k^{\frac{1}{10}} & \triangle_{as} & 36^{\frac{1}{2}} \\ \boxed{\sqrt{25}} & & \boxed{\sqrt[3]{64}} & & \boxed{\sqrt[5]{32}} & & \boxed{\sqrt[4]{256}} & & \boxed{\sqrt[7]{h}} & & \boxed{\sqrt[10]{k}} & & \boxed{\sqrt{36}} \end{array}$$

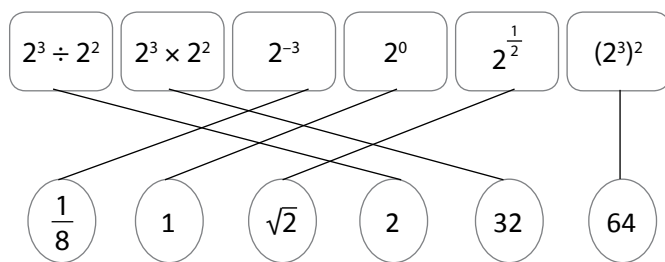
26.

| | $\sqrt[n]{a^m}$ | Indeks pecahan | $(\sqrt[n]{a})^m$ |
|-----|------------------|--------------------|--------------------|
| (a) | $\sqrt[3]{64^2}$ | $64^{\frac{2}{3}}$ | $(\sqrt[3]{64})^2$ |
| (b) | $\sqrt[4]{81^3}$ | $81^{\frac{3}{4}}$ | $(\sqrt[4]{81})^3$ |
| (c) | $\sqrt{36^3}$ | $36^{\frac{3}{2}}$ | $(\sqrt{36})^3$ |
| (d) | $\sqrt[5]{32^2}$ | $32^{\frac{2}{5}}$ | $(\sqrt[5]{32})^2$ |
| (e) | $\sqrt[9]{x^4}$ | $x^{\frac{4}{9}}$ | $(\sqrt[9]{x})^4$ |
| (f) | $\sqrt[7]{y^2}$ | $y^{\frac{2}{7}}$ | $(\sqrt[7]{y})^2$ |

| | $(a^m)^{\frac{1}{n}}$ | Indeks pecahan | $(a^{\frac{1}{n}})^m$ |
|-----|-------------------------|---------------------|-------------------------|
| (g) | $(16^3)^{\frac{1}{4}}$ | $16^{\frac{3}{4}}$ | $(16^{\frac{1}{4}})^3$ |
| (h) | $(49^5)^{\frac{1}{2}}$ | $49^{\frac{5}{2}}$ | $(49^{\frac{1}{2}})^5$ |
| (i) | $(125^7)^{\frac{1}{3}}$ | $125^{\frac{7}{3}}$ | $(125^{\frac{1}{3}})^7$ |
| (j) | $(y^2)^{\frac{1}{7}}$ | $y^{\frac{2}{7}}$ | $(y^{\frac{1}{7}})^2$ |
| (k) | $(a^4)^{\frac{1}{7}}$ | $a^{\frac{4}{7}}$ | $(a^{\frac{1}{7}})^4$ |
| (l) | $(b^3)^{\frac{1}{5}}$ | $b^{\frac{3}{5}}$ | $(b^{\frac{1}{5}})^3$ |

27. (a) $16^{\frac{1}{4}} = \sqrt[4]{16}$
 $= 2$
- (b) $243^{\frac{1}{5}} = \sqrt[5]{243}$
 $= 3$
- (c) $9^{\frac{3}{2}} = (\sqrt{9})^3$
 $= 3^3$
 $= 27$
- (d) $81^{\frac{3}{4}} = (\sqrt[4]{81})^3$
 $= 3^3$
 $= 27$
- (e) $729^{\frac{5}{6}} = (\sqrt[6]{729})^5$
 $= 3^5$
 $= 243$
- (f) $125^{\frac{2}{3}} = (\sqrt[3]{125})^2$
 $= (5)^2$
 $= 25$
- (g) $32^{\frac{2}{5}} = (\sqrt[5]{32})^2$
 $= (2)^2$
 $= 4$

28.



29. (a) $\frac{(3x^2y^4)^{\frac{1}{2}} \times 3^{\frac{3}{2}}x^2y^3}{18x^2y^{-3}}$
 $= \frac{3^{\frac{1}{2}}x^{2(\frac{1}{2})}y^{4(\frac{1}{2})} \times 3^{\frac{3}{2}}x^2y^3}{18x^2y^{-3}}$
 $= \left(\frac{3^{\frac{1}{2} + \frac{3}{2}}}{18}\right)x^{1+2-2}y^{2+3-(-3)}$
 $= \left(\frac{3^2}{18}\right)xy^8$
 $= \frac{1}{2}xy^8$

(b) $\frac{8^{\frac{3}{4}}p^{-4}q^5 \times (8p^{12}q^4)^{\frac{1}{4}}}{(2^3p^{10}q^4)^{\frac{1}{2}}}$
 $= \frac{2^{3(\frac{3}{4})}p^{-4}q^5 \times 2^{3(\frac{1}{4})}p^{12(\frac{1}{4})}q^{4(\frac{1}{4})}}{2^{3(\frac{1}{2})}p^{10(\frac{1}{2})}q^{4(\frac{1}{2})}}$
 $= \left(\frac{2^{\frac{9}{4} + \frac{3}{4}}}{2^{\frac{3}{2}}}\right)p^{-4+3-5}q^{5+1-2}$
 $= 2^{\frac{3}{2}}p^{-6}q^4$
 $= \sqrt{2^3}p^{-6}q^4$

30. (a) $\frac{(25^4)^{\frac{1}{3}} \times (25^2)^{\frac{1}{12}}}{(2^{-2})^2}$
 $= \frac{5^{2(4)(\frac{1}{3})} \times 5^{2(2)(\frac{1}{12})}}{2^{-2(2)}}$
 $= \frac{5^{\frac{8}{3}} \times 5^{\frac{1}{3}}}{2^{-4}}$
 $= 5^{\frac{8}{3} + \frac{1}{3}} \times 2^4$
 $= 5^3 \times 2^4$
 $= 2000$

(b) $\frac{(4\sqrt{16})^3 \times 5^{-2}}{(16^5)^{\frac{1}{4}}}$
 $= \frac{2^{4(\frac{1}{4})(3)} \times 5^{-2}}{2^{4(5)(\frac{1}{4})}}$
 $= 2^{3-5} \times 5^{-2}$
 $= \frac{1}{2^2 \times 5^2}$
 $= \frac{1}{100}$

31. (a) $(32^{\frac{1}{5}} \times 81^{\frac{1}{4}})^2 \div 3^{-1}$
 $= 32^{\frac{1}{5} \times 2} \times 81^{\frac{1}{4} \times 2} \div 3^{-1}$
 $= 32^{\frac{2}{5}} \times 81^{\frac{1}{2}} \div 3^{-1}$
 $= 2^{5 \times \frac{2}{5}} \times 3^{4 \times \frac{1}{2}} \div 3^{-1}$
 $= 2^2 \times 3^2 \div 3^{-1}$
 $= 4 \times 3^{2-(-1)}$
 $= 4 \times 3^3$
 $= 108$

$$\begin{aligned} \text{(b)} \quad 4^p &= \frac{64}{4^{p-3}} \\ 4^p &= \frac{4^3}{4^{p-3}} \\ 4^p &= 4^{3-(p-3)} \\ p &= 3 - p + 3 \\ 2p &= 6 \\ p &= 3 \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad 40m^{17}n^{14} \div 8m^{14}n^{10} &= 5m^x n^y \\ \frac{40}{8}m^{17-14}n^{14-10} &= 5m^x n^y \\ 5m^3 n^4 &= 5m^x n^y \\ \text{Maka/ Hence, } x &= 3, y = 4 \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad \frac{1}{25} \times 625^{(6x-13)} &= 125^{2x} \\ \frac{1}{5^2} \times 5^{4(6x-13)} &= 5^{3(2x)} \\ 5^{-2} \times 5^{24x-52} &= 5^{6x} \\ 5^{-2+24x-52} &= 5^{6x} \\ 24x - 54 &= 6x \\ 18x &= 54 \\ x &= 3 \end{aligned}$$

$$\begin{aligned} \text{(e)} \quad \frac{\sqrt{4^{-4} \times 10^4}}{16 \times 100} \\ &= \frac{4^{-\frac{4}{2}} \times 10^{\frac{4}{2}}}{4^2 \times 10^2} \\ &= \frac{4^{-2} \times 10^2}{4^2 \times 10^2} \\ &= 4^{-2-2} \times 10^{2-2} \\ &= 4^{-4} \times 10^0 \\ &= \frac{1}{4^4} \times 1 \\ &= \frac{1}{256} \end{aligned}$$

$$\begin{aligned} \text{(f)} \quad \frac{81^{\frac{3}{n}} \times 64^{\frac{n}{m}}}{m^6 \times n^6} \\ &= \frac{81^{\frac{3}{2}} \times 64^{\frac{2}{3}}}{3^6 \times 2^6} \\ &= \frac{(\sqrt{81})^3 \times (\sqrt[3]{64})^2}{3^6 \times 2^6} \\ &= \frac{(9)^3 \times (4)^2}{3^6 \times 2^6} \\ &= \frac{(3^2)^3 \times (2^2)^2}{3^6 \times 2^6} \\ &= 3^{(2 \times 3)-6} \times 2^{(2 \times 2)-6} \\ &= 3^{6-6} \times 2^{4-6} \\ &= 3^0 \times 2^{-2} \\ &= 1 \times \frac{1}{2^2} \\ &= \frac{1}{4} \end{aligned}$$

Power PT3

Bahagian **A**

$$\begin{aligned} 1. \quad 5^{\frac{2}{3}} &= m\sqrt[k]{n} = \sqrt[3]{5^2} \\ \therefore k &= 3, m = 3, n = 2 \\ \text{Jawapan/ Answer: } &\mathbf{D} \end{aligned}$$

$$\begin{aligned} 2. \quad p \times p \times p \times p \times p &= (-2)^q \\ p^5 &= (-2)^q \\ \therefore p &= -2, q = 5 \\ \text{Jawapan/ Answer: } &\mathbf{B} \end{aligned}$$

$$\begin{aligned} 3. \quad 9^3 &= (9^{\frac{1}{2}})^6 \\ &= 3^6 \\ \text{Jawapan/ Answer: } &\mathbf{A} \end{aligned}$$

$$\begin{aligned} 4. \quad a^p \times a^q &= a^{p+q} \\ \frac{a^p}{a^{-q}} &= a^{p-(-q)} \\ &= a^{p+q} \\ \text{Jawapan/ Answer: } &\mathbf{C} \end{aligned}$$

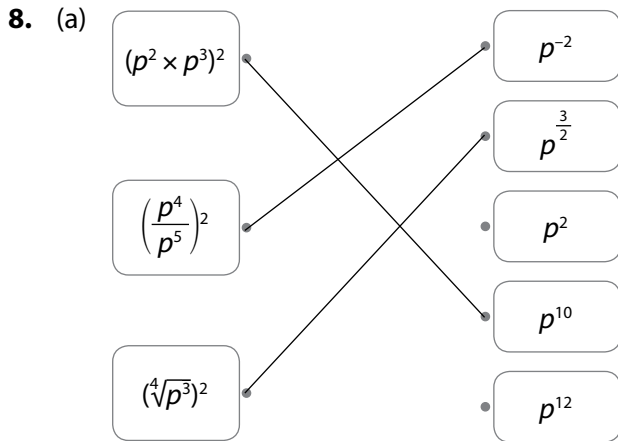
$$\begin{aligned} 5. \quad \frac{5^2}{2^4} &= \frac{5^2}{4^2} \\ &= \left(\frac{5}{4}\right)^2 \\ &= \left(\frac{4}{5}\right)^{-2} \\ \text{Jawapan/ Answer: } &\mathbf{D} \end{aligned}$$

$$\begin{aligned} 6. \quad \text{Luas/Area} \\ &= (4 \times 2 \times \sqrt[4]{m^5}) \times (2 \times \sqrt[4]{m^5}) \\ &= 16 \times (\sqrt[4]{m^5})^2 \\ &= 16 \times (m^{\frac{5}{4}})^2 \\ &= 16 \times m^{\frac{5}{2}} \\ &= 16 \times \sqrt{m^5} \\ \text{Jawapan/ Answer: } &\mathbf{C} \end{aligned}$$

Bahagian **B**

$$\begin{aligned} 7. \quad \text{(a)} \quad (7^{\frac{2}{3}} \times 56^{\frac{1}{3}})^2 \\ &= \left[\left(\boxed{49} \times \boxed{56} \right)^{\frac{1}{3}} \right]^2 \\ &= \boxed{2744}^{\frac{2}{3}} \\ &= \boxed{196} \end{aligned}$$

(b) $(-27)^{\frac{5}{3}}$, 0, $64^{-\frac{3}{2}}$, 1
 $(-125)^{\frac{2}{3}} = 25$, $(-27)^{\frac{5}{3}} = -243$,
 $64^{-\frac{3}{2}} = \frac{1}{512}$, $(\sqrt{49})^3 = 343$
 $(-27)^{\frac{5}{3}} < 0$, $0 < 64^{-\frac{3}{2}} < 1$



(b) x
 a^n , a dikenali sebagai asas dan n dikenali sebagai indeks.
a is known as the base and n is known as the index.

9. (a) $\frac{p^3 \times p^2 \times q^4}{q^m} = p^n q^{-2}$
 $p^{3+2} q^{4-m} = p^n q^{-2}$
 $p^5 q^{4-m} = p^n q^{-2}$
 $n = 5$, $4 - m = -2$
 $m = 6$

(b) $8^2 = (2^{\boxed{3}})^2 = (2^{\boxed{12}})^{\frac{1}{2}}$
 $8^2 = (8)^2$ $8^2 = (2^3)^2$
 $= (2^{\boxed{3}})^2$ $= 2^6$
 $= (2^{\boxed{12}})^{\frac{1}{2}}$

Bahagian C

10. (a) (i) $3^2 \times 3^x = 3^4$
 $3^{2+x} = 3^4$
 $2 + x = 4$
 $x = 2$

(ii) $2^y \times 4^2 = 32$
 $2^y \times (2^2)^2 = 2^5$
 $2^y \times 2^4 = 2^5$
 $2^{y+4} = 2^5$
 $y + 4 = 5$
 $y = 1$

(b) $2^x \times 2^y = 128$
 $2^{x+y} = 2^7$
 $x + y = 7 \dots\dots \textcircled{1}$

$\frac{6^x}{6} = 36^y$
 $6^{x-1} = (6^2)^y$
 $6^{x-1} = 6^{2y}$
 $x - 1 = 2y$
 $x - 2y = 1 \dots\dots \textcircled{2}$

$\textcircled{1} - \textcircled{2}$: $y - (-2y) = 7 - 1$
 $3y = 6$
 $y = 2$

Gantikan $y = 2$ ke dalam $\textcircled{1}$:
Substitute $y = 2$ into $\textcircled{1}$:
 $x + 2 = 7$
 $x = 5$

(c) $P = 2n$, $Q = 3^n$
 $PQ = 7\,776$
 $2^n \times 3^n = 7\,776$
 $6^n = 6^5$
 $n = 5$
 $P = 2^5$
 $= 32$
 $Q = 3^5$
 $= 243$

11. (a) (i) $4\,096 = 8^4$

| | |
|---|-------|
| 8 | 4 096 |
| 8 | 512 |
| 8 | 64 |
| 8 | 8 |
| | 1 |

(ii) $4\,096 = 8^4$
 $= (8^{\frac{1}{3}})^{12}$
 $= 2^{12}$

(b) (i) $p^3 \times p^7 = p^{3+7}$
 $= p^{10}$

(ii) $q^8 \div q^4 = q^{8-4}$
 $= q^4$

(iii) $(r^3 t^4)^3 = r^{3 \times 3} \times t^{4 \times 3}$
 $= r^9 \times t^{12}$
 $= r^9 t^{12}$

(c) Isi padu 16 buah kuboid
Volume of 16 cuboids
 $= 16 \times (2 \times 3^{2n}) \times 3^n \times 2^n$
 $= 2^4 \times 2 \times 3^{2n} \times 3^n \times 2^n$
 $= 2^4 \times 2 \times 2^n \times 3^{2n} \times 3^n$
 $= 2^{4+1+n} \times 3^{2n+n}$
 $= (2^{n+5} \times 3^{3n}) \text{ cm}^3$

Power KBAT

$$1. \quad 2^{x^2} \times 2^{7x} = \frac{1}{2^{10}}$$

$$2^{x^2} \times 2^{7x} = 2^{-10}$$

$$2^{x^2+7x} = 2^{-10}$$

Secara perbandingan / *By comparison,*

$$x^2 + 7x = -10$$

$$x^2 + 7x + 10 = 0$$

$$(x + 5)(x + 2) = 0$$

$$x + 5 = 0$$

$$x = -5$$

atau/ *or*

$$x + 2 = 0$$

$$x = -2$$

Maka, nilai-nilai x yang mungkin ialah -5 dan -2 .
Hence, the possible values of x are -5 and -2 .

$$2. \quad 64^x \times 2^{2y} = 2^2$$

$$2^{6(x)} \times 2^{2y} = 2^2$$

$$2^{6x+2y} = 2^2$$

$$6x + 2y = 2 \dots\dots \textcircled{1}$$

$$3^x \times \frac{1}{3^y} = 27$$

$$3^x \times 3^{-y} = 3^3$$

$$3^{x-y} = 3^3$$

$$x - y = 3 \dots\dots \textcircled{2}$$

Daripada / *From* $\textcircled{2}$, $y = x - 3 \dots\dots \textcircled{3}$

Gantikan $\textcircled{3}$ ke dalam $\textcircled{1}$,

Substitute $\textcircled{3}$ into $\textcircled{1}$,

$$6x + 2(x - 3) = 2$$

$$6x + 2x - 6 = 2$$

$$8x = 8$$

$$x = 1$$

Gantikan $x = 1$ ke dalam $\textcircled{3}$,

Substitute $x = 1$ into $\textcircled{3}$,

$$y = x - 3$$

$$= 1 - 3$$

$$= -2$$

Maka / *Hence*, $x = 1$ dan / *and* $y = -2$

JAWAPAN

BAB 2

Bentuk Piawai Standard Form

1. (a) Ukuran panjang rod itu ialah 23.5 cm.

The measurement of the rod is 23.5 cm.

- (b) Tulis semula bacaan anda di (a) dan bulatkan digit yang tidak pasti.

Rewrite your reading in (a) and circle the digit that is uncertain.

23.5

- (c) Kejituan pengukuran panjang itu ialah 3 angka bererti.

The precision of the measurement is 3 significant figures.

- (d) Angka bererti satu nombor ialah digit-digit yang menunjukkan tahap kejituan tertentu.

Significant figures of a number are the digits that express a specified degree of accuracy.

2. (a) 1 129
4 angka bererti
4 significant figures

- (b) 72.4
3 angka bererti
3 significant figures

- (c) 27.86
4 angka bererti
4 significant figures

- (d) 402
3 angka bererti
3 significant figures

- (e) 3 006
4 angka bererti
4 significant figures

- (f) 20 004
5 angka bererti
5 significant figures

- (g) 5 107
4 angka bererti
4 significant figures

- (h) 300
1 angka bererti
1 significant figure

- (i) 50
1 angka bererti
1 significant figure

- (j) 7 200
2 angka bererti
2 significant figures

- (k) 112 240
5 angka bererti
5 significant figures

- (l) 0.007
1 angka bererti
1 significant figure

- (m) 0.0302
3 angka bererti
3 significant figures

- (n) 0.00083
2 angka bererti
2 significant figures

- (o) 0.00516
3 angka bererti
3 significant figures

- (p) 1.00
3 angka bererti
3 significant figures

- (q) 23.000
5 angka bererti
5 significant figures

- (r) 0.60
2 angka bererti
2 significant figures

- (s) 7.1400
5 angka bererti
5 significant figures

3. Angka bererti (a.b.) Significant figures (s.f.)

| 1 a.b. 1 s.f. | 2 a.b. 2 s.f. | 3 a.b. 3 s.f. | 4 a.b. 4 s.f. | 5 a.b. 5 s.f. |
|------------------|------------------|------------------|------------------|------------------|
| 200 | 0.0017 | 0.00670 | 56.33 | 33.300 |
| 0.1 | 380 | 1.08 | 3 007 | 56.012 |
| 6 000 | 4.0 | 5 090 | 80.00 | 22 506 |
| 0.04 | 0.012 | 0.210 | 9.045 | 540.09 |

4.

| | Ukuran Measurement | 1 a. b. 1 s. f. | 2 a. b. 2 s. f. | 3 a. b. 3 s. f. | 4 a. b. 4 s. f. |
|-----|-----------------------|--------------------|--------------------|--------------------|--------------------|
| (a) | 11 564 | 10 000 | 12 000 | 11 600 | 11 560 |
| (b) | 22 099 | 20 000 | 22 000 | 22 100 | 22 100 |
| (c) | 30 783 | 30 000 | 31 000 | 30 800 | 30 780 |
| (d) | 198 232 | 200 000 | 200 000 | 198 000 | 198 200 |
| (e) | 0.0032181 | 0.003 | 0.0032 | 0.00322 | 0.003218 |
| (f) | 198.73 | 200 | 200 | 199 | 198.7 |
| (g) | 4.0032 | 4 | 4.0 | 4.00 | 4.003 |
| (h) | 0.12005 | 0.1 | 0.12 | 0.120 | 0.1201 |

5. (a) 30 (b) 20
 (c) 32.9 (d) 70 020
 (e) 0.070 (f) 0.002
 (g) 6.0 (h) 20 000
 (i) 572 (j) 198 000
 (k) 200 000 (l) 7.235
 (m) 850 900 (n) 3.5
 (o) 51.75

6. (a) $81 \div 2.4 + 12.4$ [1]
 $= 33.75 + 12.4$
 $= 46.15$
 $= 50$
 (b) $8.16 + 19.4 - 9.19$ [3]
 $= 27.56 - 9.19$
 $= 18.37$
 $= 18.4$
 (c) $32.41 \times 2.23 + 77.1 \div 5$ [4]
 $= 72.2743 + 15.42$
 $= 87.6943$
 $= 87.69$
 (d) $51.03 - 3.13 \times 6.7 + 6.6$ [2]
 $= 51.03 - 20.971 + 6.6$
 $= 36.659$
 $= 37$

7. (a) 2.1×10^4
 (b) 0.63×10^{-3}
 (c) 25×10^7
 (d) 9×10^{-2}
 (e) 0.08×10
 (f) $3.4 \times 10^{1.5}$
 (g) 1.33×10^{100}

- (h) $7 \times 10^{\frac{1}{2}}$
 (i) 1.0×10^{-10}

8. (a) 23 000
 $= 2.3 \times 10\ 000$
 $= 2.3 \times 10^4$
 (b) 5 623
 $= 5.623 \times 1\ 000$
 $= 5.623 \times 10^3$
 (c) 781 900
 $= 7.819 \times 100\ 000$
 $= 7.819 \times 10^5$
 (d) 1 400 000
 $= 1.4 \times 1\ 000\ 000$
 $= 1.4 \times 10^6$
 (e) 0.0042
 $= 4.2 \times 0.001$
 $= 4.2 \times 10^{-3}$
 (f) 0.01873
 $= 1.873 \times 0.01$
 $= 1.873 \times 10^{-2}$
 (g) 0.0000338
 $= 3.38 \times 0.00001$
 $= 3.38 \times 10^{-5}$
 (h) 0.00052
 $= 5.2 \times 0.0001$
 $= 5.2 \times 10^{-4}$
9. (a) 8×10^5
 $= 8 \times 100\ 000$
 $= 800\ 000$
 (b) 9.3×10^6
 $= 9.3 \times 1\ 000\ 000$
 $= 9\ 300\ 000$
 (c) 1.82×10^7
 $= 1.82 \times 10\ 000\ 000$
 $= 18\ 200\ 000$
 (d) 7.265×10^8
 $= 7.265 \times 100\ 000\ 000$
 $= 726\ 500\ 000$
 (e) 3×10^{-2}
 $= 3 \times 0.01$
 $= 0.03$
 (f) 2.7×10^{-4}
 $= 2.7 \times 0.0001$
 $= 0.00027$

(g) 3.023×10^{-5}
 $= 3.023 \times 0.00001$
 $= 0.00003023$

(h) 5.36×10^{-6}
 $= 5.36 \times 0.000001$
 $= 0.00000536$

10. (a) 1 megajoule = 1×10^6 joule
- (b) 1 miliampere = 1×10^{-3} ampere
 1 milliampere ampere
- (c) 1 kilowatt = 1×10^3 watt
- (d) 1 nanogram = 1×10^{-9} gram
- (e) 1 sentimeter = 1×10^{-2} meter
 1 centimetre metre
- (f) 1 terabait = 1×10^{12} bait
 1 terabyte byte
- (g) 1 mikrometer = 1×10^{-6} meter
 1 micrometre metre
- (h) 1 gigabait = 1×10^9 bait
 1 gigabyte byte
- (i) 1 pikometer = 1×10^{-12} meter
 1 picometre metre
- (j) 1 femtometer = 1×10^{-15} meter
 1 femtometre metre

11. (a) 2 310 gigabait [bait]
 2 310 gigabytes [byte]
 $= 2.31 \times 10^3 \times 10^9$
 $= 2.31 \times 10^{3+9}$
 $= 2.31 \times 10^{12}$ bait/ bytes
- (b) 323 milimeter [meter]
 323 millimetres [metre]
 $= 3.23 \times 10^2 \times 10^{-3}$
 $= 3.23 \times 10^{2+(-3)}$
 $= 3.23 \times 10^{-1}$ meter/ metre
- (c) 0.045 desimeter [meter]
 0.045 decimetre [metre]
 $= 4.5 \times 10^{-2} \times 10^{-1}$
 $= 4.5 \times 10^{-2+(-1)}$
 $= 4.5 \times 10^{-3}$ meter/ metre
- (d) 0.543 petaliter [liter]
 0.543 petalitre [litre]
 $= 5.43 \times 10^{-1} \times 10^{15}$
 $= 5.43 \times 10^{-1+15}$
 $= 5.43 \times 10^{14}$ liter/ litre

12. (a) $3.4 \times 10^4 + 6.1 \times 10^4$
 $= (3.4 + 6.1) \times 10^4$
 $= 9.5 \times 10^4$

(b) $8.9 \times 10^3 - 1.2 \times 10^3$
 $= (8.9 - 1.2) \times 10^3$
 $= 7.7 \times 10^3$

(c) $1.98 \times 10^{-5} - 1.08 \times 10^{-5}$
 $= (1.98 - 1.08) \times 10^{-5}$
 $= 0.9 \times 10^{-5} \leftarrow 9 \times 10^{-1} \times 10^{-5}$
 $= 9 \times 10^{-6}$

(d) $9.3 \times 10^{-5} + 2.13 \times 10^{-4}$
 $= 0.93 \times 10^{-4} + 2.13 \times 10^{-4}$
 $= (0.93 + 2.13) \times 10^{-4}$
 $= 3.06 \times 10^{-4}$

(e) $4.05 \times 10^{-7} - 2.2 \times 10^{-8}$
 $= 4.05 \times 10^{-7} - 0.22 \times 10^{-7}$
 $= (4.05 - 0.22) \times 10^{-7}$
 $= 3.83 \times 10^{-7}$

(f) $2.4 \times 10^7 \times 1.8 \times 10^{-3}$
 $= 2.4 \times 1.8 \times 10^{7+(-3)}$
 $= 4.32 \times 10^4$

(g) $7\,200\,000 \times 1.5 \times 10^{-4}$
 $= 7.2 \times 10^6 \times 1.5 \times 10^{-4}$
 $= 7.2 \times 1.5 \times 10^{6+(-4)}$
 $= 10.8 \times 10^2 \leftarrow 1.08 \times 10 \times 10^2$
 $= 1.08 \times 10^3$

(h) $1.2 \times 10^5 \div (6 \times 10^5)$
 $= \frac{1.2}{6} \times 10^{5-5}$
 $= 0.2 \times 10^0 \leftarrow 10^0 = 1$
 $= 2 \times 10^{-1}$

(i) $7.9 \times 10^2 \times 2.1 \times 10^{-4}$
 $= 7.9 \times 2.1 \times 10^{2+(-4)}$
 $= 16.59 \times 10^{-2}$
 $= 1.659 \times 10 \times 10^{-2}$
 $= 1.659 \times 10^{-1}$

(j) $\frac{1.8 \times 10^{-9}}{5 \times 10^8}$
 $= \frac{1.8}{5} \times \frac{10^{-9}}{10^8}$
 $= 0.36 \times 10^{-9-8}$
 $= 3.6 \times 10^{-1} \times 10^{-17}$
 $= 3.6 \times 10^{-18}$

$$\begin{aligned} \text{(k)} \quad & \frac{4\,800}{2.5 \times 10^6} \\ &= \frac{4.8 \times 10^3}{2.5 \times 10^6} \\ &= \frac{4.8}{2.5} \times 10^{3-6} \\ &= 1.92 \times 10^{-3} \end{aligned}$$

$$\begin{aligned} \text{(l)} \quad & \frac{6.3 \times 10^{-5}}{12\,000} \\ &= \frac{6.3 \times 10^{-5}}{1.2 \times 10^4} \\ &= \frac{6.3}{1.2} \times 10^{-5-4} \\ &= 5.25 \times 10^{-9} \end{aligned}$$

13. (a) (i) Ketebalan sehelai kertas dalam mm
Thickness of a sheet of paper in mm
 $= 55 \div 800$
 $= 0.06875$
 $= 6.875 \times 10^{-2} \text{ mm}$

(ii) Ketebalan sehelai kertas dalam cm
Thickness of a sheet of paper in cm
 $= 6.875 \times 10^{-2} \times 10^{-1}$
 $= 6.875 \times 10^{-2+(-1)}$
 $= 6.875 \times 10^{-3} \text{ cm}$

(b) (i) 1 jam = 60 minit
1 hour = 60 minutes
 Bilangan mainan yang dapat dihasilkan dalam 1 jam
The number of toys produced in 1 hour
 $= 55 \times 60$
 $= 3\,300$
 $= 3.3 \times 10^3$

(ii) Bilangan mainan yang dapat dihasilkan dalam 20 hari
The number of toys produced in 20 days
 $= 3.3 \times 10^3 \times 8 \times 20$
 $= 3.3 \times 10^3 \times 1.6 \times 10^2$
 $= 5.28 \times 10^{3+2}$
 $= 5.28 \times 10^5$

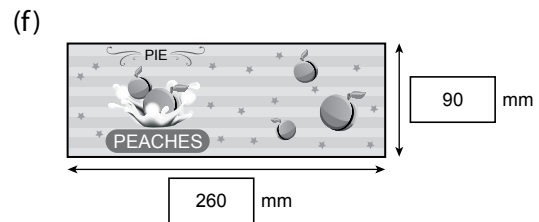
(c) 3 hari = $3 \times 24 \times 60$
3 days = 4 320
 $= 4.32 \times 10^3 \text{ minit}$
 $4.32 \times 10^3 \text{ minutes}$
 Jarak yang dilalui dalam masa seminit
Distance travelled in a minute
 $= \frac{3.84 \times 10^5}{4.32 \times 10^3}$
 $= \frac{3.84}{4.32} \times 10^{5-3}$
 $= 0.889 \times 10^2$
 $= 8.89 \times 10^{-1} \times 10^2$
 $= 8.89 \times 10 \text{ km}$

(d) Jarak = Laju \times Masa
Distance = Speed \times Time
 $= 100 \times 717 \times 365 \times 24$
 $= 628\,092\,000$
 $= 6.28 \times 10^8 \text{ km}$

(e) (i) $2(3.2 \times 10^6) + 2(5 \times 10^5)$
 $= 6.4 \times 10^6 + 10 \times 10^5$
 $= 6.4 \times 10^6 + 1 \times 10^{1+5}$
 $= 6.4 \times 10^6 + 1 \times 10^6$
 $= (6.4 + 1) \times 10^6$
 $= 7.4 \times 10^6 \text{ m}$

(ii) $3.2 \times 10^6 \times 5 \times 10^5$
 $= 3.2 \times 5 \times 10^6 \times 10^5$
 $= 16 \times 10^{6+5}$
 $= 16 \times 10^{11}$
 $= 1.6 \times 10 \times 10^{11}$
 $= 1.6 \times 10^{1+11}$
 $= 1.6 \times 10^{12} \text{ m}^2$

$2 \times 3.142 \times 40$
 $= 251.36 \text{ mm}$



(i) Luas permukaan/ *Surface area*
 $= 2\pi r^2 + 2\pi r h$ ($2\pi r^2 + 2\pi r h$)
 $= 2 \times 3.142 \times 40^2 + 2 \times 3.142 \times 40 \times 90$
 $= 10\,054.4 + 22\,622.4$
 $= 32\,676.8$
 $= 3.268 \times 10^4 \text{ mm}^2$

(ii) Mana-mana jawapan lain yang sesuai
Any other possible answers

(g) (i) Diameter bakteria jenis B
Diameter of bacteria species B
 $= 1 \times 10^{-6} \times 1 \times 10^{-3}$
 $= 1 \times 10^{-6+(-3)}$
 $= 1 \times 10^{-9} \text{ m}$
 (ii) $1 \times 10^{-9} \text{ m} = 1 \text{ nm}$
 Nilai yang diperolehi itu sama dengan 1 nanometer.
The value obtained is equal to 1 nanometre.

Power PT3

Bahagian A

1. Semua sifar selepas digit bukan sifar terakhir dalam suatu nombor perpuluhan ialah angka bererti.

All zeros after the last non-zero digit in a decimal number are significant figures.

Jawapan/ Answer: **D**

2. Bilangan angka bererti yang mungkin bagi 3 400 ialah 2, 3 dan 4.

The possible number of significant figures for the number 3 400 are 2, 3 and 4.

Jawapan/ Answer: **A**

3. $52\,542 \rightarrow 52\,540$ (4 a.b. / 4 s.f.)
 $34\,780 \rightarrow 34\,800$ (3 a.b. / 3 s.f.)
 $20\,004 \rightarrow 20\,000$ (1 a.b. / 1 s.f.)
 $17\,513 \rightarrow 20\,000$ (1 a.b. / 1 s.f.)

Jawapan/ Answer: **C**

4. 6 lebih besar daripada 5, maka tambah 1 kepada digit 4 dan gantikan digit 6 dengan 0.

6 is larger than 5, then add 1 to digit 4 and replace digit 6 with 0.

$$0.0746 \rightarrow 0.075 \text{ (2 a.b. / s.f.)}$$

Jawapan/ Answer: **B**

5. Bentuk piawai: $a \times 10^n$ dengan keadaan $1 \times A < n$ dan n ialah integer. Indeks bagi 10 dalam $5.662 \times 10^{3.5}$ bukan integer.

Standard form: $a \times 10^n$ where $1 \times A < n$ and n is an integer. The index of 10 in $5.662 \times 10^{3.5}$ is not an integer.

Jawapan/ Answer: **D**

6. 35 juta / million = $35 \times 1\,000\,000$
 $= 3.5 \times 10^7$

Jawapan/ Answer: **C**

7. $4.7 \times 10^{-4} = 4.7 \times \frac{1}{10\,000}$
 $= 0.00047$

Jawapan/ Answer: **B**

8. $3.1 \times 10^5 - 4.632 \times 10^4 = 263\,680$
 $= 264\,000$ (3 a.b. / 3 s.f.)
 $= 2.64 \times 10^5$

Jawapan/ Answer: **D**

Bahagian B

9. (a) $4 \times 10^6 \times 9 \times 10^6$
 $= 36 \times 10^{12}$
 $= 3.6 \times 10^{13}$

- (b) 1 2 3 4

10.

| | Awalan Prefix | Nilai Value | ✓ / ✗ |
|-----|---------------|---------------------|-------|
| (a) | femto | 1×10^{-15} | ✓ |
| (b) | atto | 1×10^{-18} | ✓ |
| (c) | mega | 1×10^9 | ✗ |
| (d) | tera | 1×10^{12} | ✓ |

11. (a)

| | | |
|--------------------------------|--------------------------------|-----------------------------|
| 3 850 megabait megabytes | 0.025 terabait terabytes | 36 gigabait gigabytes |
|--------------------------------|--------------------------------|-----------------------------|

$$0.025 \text{ terabait / terabyte}$$

$$= 0.025 \times 10^{12} \text{ bait / bytes}$$

$$= 2.5 \times 10^{10} \text{ bait / bytes}$$

$$36 \text{ gigabait / gigabytes}$$

$$= 36 \times 10^9 \text{ bait / bytes}$$

$$= 3.6 \times 10^{10} \text{ bait / bytes}$$

$$3\,850 \text{ megabait / megabytes}$$

$$= 3\,850 \times 10^6 \text{ bait / bytes}$$

$$= 3.85 \times 10^9 \text{ bait / bytes}$$

- (b) 36 gigabait / gigabytes
 $= 3.6 \times 10^{10} \text{ bait / bytes}$
 $= 4 \times 10^{10} \text{ bait / bytes}$ (1 a.b. / 1 s.f.)

Bahagian C

3. (a) 2×10^{-8} meter, 4×10^{-7} meter

$$20 \text{ nm} = 20 \times 10^{-9} \text{ m} = 2 \times 10^{-8} \text{ m}$$

$$400 \text{ nm} = 400 \times 10^{-9} \text{ m} = 4 \times 10^{-7} \text{ m}$$

(b) (i) $3.42 \times 10^4 + 4.5 \times 10^3$
 $= 3.42 \times 10^4 + 0.45 \times 10^4$
 $= (3.42 + 0.45) \times 10^4$
 $= 3.87 \times 10^4$

(ii) $\frac{2.5 \times 10^7}{4 \times 10^3}$
 $= \frac{2.5}{4} \times \frac{10^7}{10^3}$
 $= 0.625 \times 10^{7-3}$
 $= 0.625 \times 10^4$
 $= 6.25 \times 10^3$

(c) Pelan A / Plan A
 $\frac{8 \text{ GB}}{\text{RM}32} = \frac{8 \times 10^9}{\text{RM}32}$
 $= 2.5 \times 10^8 \text{ bait / RM1}$

Pelan B / Plan B
 $\frac{600 \text{ MB}}{\text{RM}8} = \frac{600 \times 10^6 \text{ bait}}{\text{RM}8}$
 $= 7.5 \times 10^7 \text{ bait / RM1}$

Oleh sebab data internet pelan A bagi setiap RM1 adalah lebih tinggi, maka pelan A adalah lebih murah.
Since the internet data of plan A for every RM1 is higher, plan A is cheaper.

Power KBAT

1.

| | | | |
|--|--------|--------|--------|
| Tilam/ <i>Mattress</i> RM255.86 | ✓ | ✓ | |
| Sofa/ <i>Sofa</i> RM225.99 | ✓ | | ✓ |
| Rak buku/ <i>Bookshelf</i> RM297.68 | | ✓ | ✓ |
| Jumlah harga (RM) <i>Total price (RM)</i> | 481.85 | 553.54 | 523.67 |

↑
 Tidak cukup wang
Not enough money

Menerima baki paling rendah: Sofa dan rak buku
Receive the lowest balance: Sofa and bookshelf

Jumlah harga = RM523.67 = RM524 (3 a.b. / 3 s.f.)
Total price

2. $1 \text{ cm}^2 = 100 \text{ mm}^2$

Jisim bagi 1 mm^2 kertas graf

Mass of 1 mm^2 of graph paper

$$= (322 \text{ g} \div 50) \div (560 \times 100 \text{ mm}^2)$$

$$= \frac{6.44 \text{ g}}{56\,000 \text{ mm}^2}$$

$$= 0.000115$$

$$= 1.15 \times 10^{-4} \text{ g}$$

JAWAPAN

BAB
3

Matematik Pengguna: Simpanan dan Pelaburan, Kredit dan Hutang Consumer Mathematics: Savings and Investments, Credit and Debt

1. simpanan , pelaburan
savings , investment

2.

Zaidi menyimpan sejumlah wang dalam satu akaun yang menawarkan kadar faedah yang lebih tinggi tetapi tidak boleh mengeluarkan wang sehingga tempoh matang.

Zaidi saves a certain amount of money in an account that offers a higher interest rate but cannot withdraw the money before the maturity date.

Encik Adzim menyimpan sejumlah wang dalam satu akaun untuk mengeluarkan cek semasa berurusan dengan pembekal.

Encik Adzim saves a certain amount of money in an account to issue cheques when dealing with suppliers.

Samad menyimpan wang gajinya dalam satu akaun yang dia boleh mengeluarkan wang pada bila-bila masa.

Samad saves his salary in an account that he can withdraw the money at any time.

Akaun simpanan
Savings account

Akaun simpanan tetap
Fixed deposit account

Akaun semasa
Current account

3. (a) Amanah saham dikendalikan oleh syarikat unit amanah yang diuruskan oleh pengurus profesional yang bertauliah dalam bidang pelaburan.

Unit trust is controlled by a unit trust company

that is managed by a qualified professional manager in the field of investment.

(b) Pelaburan atas aset tidak alih seperti rumah kediaman, kedai, tanah dan sebagainya merupakan pelaburan dalam hartanah.

Investments on immovable assets such as residential houses, shops, land and others are investments in real estate.

(c) Individu yang membeli saham daripada sebuah syarikat merupakan pemilik syarikat dengan syarat tertentu.

An individual who purchases shares from a company is the owner of the company under certain conditions.

4. (a) Jumlah simpanan

$$\begin{aligned} \text{Total savings} &= \text{prinsipal} + \text{faedah} \\ &= \text{principal} + \text{interest} \\ &= 8\,000 + \left(8\,000 \times \frac{2}{100} \times 2\right) \\ &= \text{RM}8\,320 \end{aligned}$$

(b) Nilai matang

$$\begin{aligned} \text{Matured value} &= 15\,000 \left(1 + \frac{0.035}{12}\right)^{12(5)} \\ &= \text{RM}17\,864.14 \end{aligned}$$

(c) Jumlah simpanan

$$\begin{aligned} \text{Total savings} &= \text{prinsipal} + \text{faedah} \\ &= \text{principal} + \text{interest} \\ &= 5\,000 + \left(5\,000 \times \frac{2.5}{100} \times \frac{10}{12}\right) \\ &= \text{RM}5\,104.17 \end{aligned}$$

(d) Nilai matang
Matured value

$$= 20\,000 \left(1 + \frac{0.04}{1}\right)^{1(12)}$$

$$= \text{RM}32\,020.64$$

5. (a) (i) Jumlah simpanan/ Total savings
= prinsipal + faedah / principal + interest

$$= 6\,000 + \left(6\,000 \times \frac{3.2}{100} \times 3\right)$$

$$= \text{RM}6\,576$$

(ii) Jumlah simpanan/ Total savings
= prinsipal + faedah / principal + interest

$$= 6\,000 + \left(6\,000 \times \frac{3.2}{100} \times 4\right)$$

$$= \text{RM}6\,768$$

Semakin lama tempoh simpanan (di bank), semakin tinggi jumlah faedah yang diperolehi. Dengan ini, jumlah simpanan juga bertambah.

The longer the savings period (at the bank), the higher the total interest earned. With this, the total savings also increases.

(b) (i) Jumlah simpanan/ Total savings
= prinsipal + faedah / principal + interest

$$= 2\,000 + \left(2\,000 \times \frac{2}{100} \times 1\right)$$

$$= 2\,000 + 40$$

$$= \text{RM}2\,040$$

(ii) Jumlah simpanan/ Total savings
= prinsipal + faedah / principal + interest

$$= 2\,000 + \left(2\,000 \times \frac{3}{100} \times 1\right)$$

$$= 2\,000 + 60$$

$$= \text{RM}2\,060$$

Bagi prinsipal yang sama, apabila kadar faedah bertambah, jumlah simpanan akan bertambah.

For the same principal, when the interest rates increase, the total savings will increase.

(c) (i) dikompaunkan 6 bulan sekali, $n = 2$
compounded once every 6 months

$$MV = P \left(1 + \frac{r}{n}\right)^{nt}$$

$$= 15\,000 \left(1 + \frac{0.04}{2}\right)^{2(1)}$$

$$= \text{RM}15\,606$$

(ii) dikompaunkan 3 bulan sekali, $n = 4$
compounded once every 3 months

$$MV = P \left(1 + \frac{r}{n}\right)^{nt}$$

$$MV = P \left(1 + \frac{r}{n}\right)^{nt}$$

$$= 15\,000 \left(1 + \frac{0.04}{4}\right)^{4(1)}$$

$$= \text{RM}15\,609.06$$

Apabila kekerapan pengkompaunan bertambah, nilai masa hadapan simpanan akan bertambah.

When the compounding frequency increases, the future value of savings will increase.

6. (a) $\frac{\text{Tinggi}}{\text{Rendah}}$
 $\frac{\text{Higher}}{\text{Lower}}$

(b) $\frac{\text{Tinggi}}{\text{Rendah}}$
 $\frac{\text{Higher}}{\text{Lower}}$

(c) $\frac{\text{Tinggi}}{\text{Rendah}}$
 $\frac{\text{Higher}}{\text{Lower}}$

7. (a) Modal awal/ Initial capital = RM8 000
Jumlah pulangan/ Total return

$$= \text{RM}200 + (\text{RM}8\,800 - \text{RM}8\,000)$$

$$= \text{RM}200 + \text{RM}800$$

$$= \text{RM}1\,000$$

$$\text{ROI} = \frac{\text{RM}1\,000}{\text{RM}8\,000} \times 100\%$$

$$= 12.5\%$$

$$\frac{\text{jumlah pulangan}}{\text{nilai pelaburan awal}} \times 100\%$$

$$= \frac{\text{total return}}{\text{Initial investment value}} \times 100\%$$

(b) Modal awal/ Initial capital = RM10 000
Jumlah pulangan/ Total return

$$= \text{RM}350 \times 2 + (\text{RM}10\,400 - \text{RM}10\,000)$$

$$= \text{RM}700 + \text{RM}400$$

$$= \text{RM}1\,100$$

$$\text{ROI} = \frac{\text{RM}1\,100}{\text{RM}10\,000} \times 100\%$$

$$= 11\%$$

(c) (i)
$$\text{ROI} = \frac{\text{RM}4\,800 - \text{RM}4\,000}{\text{RM}4\,000} \times 100\%$$

$$= 20\%$$

(ii) Kejadian pencemaran udara atau jerebu menyebabkan permintaan topeng muka bertambah. Jadi, harga topeng muka akan bertambah dan pulangan Encik Tan akan bertambah.
The occurrence of air pollution and haze increases masks' demand. Consequently, mask's price will hike and this will cause

Mr Tan's return to increase.

8. (a) (✓)
(b) (X)
(c) (✓)

9.

| | Rendah <i>Low</i> | Sederhana <i>Moderate</i> | Tinggi <i>High</i> |
|---|--|--------------------------------|--|
| (a) Risiko <i>Risk</i> | akaun simpanan tetap <i>fixed deposit account</i> | hartanah <i>real estate</i> | saham <i>shares</i> |
| (b) Kecairan <i>Liquidity</i> | hartanah <i>real estate</i> | saham <i>shares</i> | akaun simpanan tetap <i>fixed deposit account</i> |

10. (a) Pulangan akaun simpanan tetap adalah lebih rendah daripada hartanah.

Return of fixed deposit account is lower than real estate.

- (b) Risiko amanah saham adalah lebih tinggi daripada akaun simpanan.

Risk of unit trust is higher than savings account.

- (c) Pulangan akaun simpanan adalah lebih rendah daripada amanah saham.

Return of savings account is lower than unit trust.

- (d) Kecairan saham adalah lebih rendah daripada akaun simpanan.

Liquidity of shares is lower than savings account.

11. (a) Amanah saham/ Unit trusts

- (b) Risiko – rendah; Pulangan – sederhana; Kecairan – tinggi

Risk – low; Return – moderate; Liquidity – high

12. (a)

| Bulan <i>Month</i> | Jumlah pelaburan <i>Investment amount</i> |
|-----------------------|--|
| April | RM12 450 |
| Mei / May | RM12 450 |
| Jumlah / Total | RM24 900 |

Jumlah saham/ Total shares

$$= \frac{12\,450}{2.10} + \frac{12\,450}{2.04}$$

$$= 5\,929 + 6\,103$$

$$= 12\,032 \text{ unit/ } 12\,032 \text{ units}$$

- (b) Jumlah saham/ Total shares

$$= \frac{6\,000}{2.30} + \frac{6\,000}{2.10} + \frac{6\,000}{2.05} + \frac{6\,000}{2.20}$$

$$= 2\,609 + 2\,857 + 2\,927 + 2\,727$$

$$= 11\,120 \text{ unit/ } 11\,120 \text{ units}$$

Jumlah pelaburan setiap bulan
Investment amount each month
 $= \frac{\text{RM}24\,000}{4}$
 $= \text{RM}6\,000$

Kos purata/ Average cost

$$= \frac{24\,000}{11\,120}$$

$$= \text{RM}2.16$$

jumlah pelaburan bilangan unit yang dimiliki
investment amount number of share units owned

- (c) $3.20 = \frac{8\,000}{\text{Jumlah unit yang dimiliki}}$
Total units owned

Jumlah unit yang dimiliki/ Total units owned

$$= \frac{8\,000}{3.20}$$

$$= 2\,500 \text{ unit/ } 2\,500 \text{ units}$$

- (d) (i) Jumlah saham / Total shares

$$= \frac{3\,000}{1.25} + \frac{3\,000}{1.24} + \frac{3\,000}{1.22}$$

$$= 2\,400 + 2\,419 + 2\,459$$

$$= 7\,278 \text{ unit/ } 7\,278 \text{ units}$$

Kos purata/ Average cost

$$= \frac{9\,000}{7\,278}$$

$$= \text{RM}1.24$$

- (ii) Strategi pemurataan kos ringgit digunakan. Strategi ini dapat mengurangkan risiko pelaburan dengan mengurangkan purata harga pembelian.

Ringgit cost averaging strategy is used. This strategy helps in reducing investment risk by bringing down average purchasing cost.

- (e) (i) Kos purata seunit saham

Average cost per share

$$= \frac{12 \times 200}{3\,105}$$

$$= \text{RM}0.77$$

- (ii) Jumlah unit yang dibeli

$$\begin{aligned} & \text{Total units purchased} \\ &= \frac{2\,400}{0.85} \\ &= 2\,824 \text{ unit/ } 2\,824 \text{ units} \end{aligned}$$

- (iii) Pembelian secara berasingan dan berturutan lebih bermanfaat kepada Jasraj. Hal ini demikian kerana Jasraj mendapat purata harga pembelian yang lebih rendah dan jumlah unit yang lebih banyak berbanding dengan pembelian sekali gus.

Separately and continually purchase is more beneficial for Jasraj. This is because Jasraj manages to get a lower average purchase price and hold more units when compared to lump sum purchase.

13. (a) (i) $MV = 25\,000 \left(1 + \frac{0.038}{2}\right)^{2(1)}$
 $= \text{RM}25\,959.03$

Separuh simpanan Encik Subra telah dikeluarkan. Half of Encik Subra's savings has uplifted.

Jumlah pulangan
Total return
 $= 25\,959.03 - 25\,000$
 $= \text{RM}959.03$

Nilai pulangan pelaburan (simpanan tetap)

Return on investment (fixed deposit)
 $= \frac{959.03}{25\,000} \times 100\%$
 $= 3.84\%$

- (ii) Jumlah saham
Total shares

$$\begin{aligned} &= \frac{12\,500}{2.25} + \frac{12\,500}{2.30} \\ &= 5\,556 + 5\,435 \\ &= 10\,991 \text{ unit} \\ &10\,991 \text{ units} \end{aligned}$$

Kos purata seunit saham
Average cost per share

$$\begin{aligned} &= \frac{25\,000}{10\,991} \\ &= \text{RM}2.27 \end{aligned}$$

- (iii) Jumlah pulangan
Total return

= keuntungan modal
capital gain
 $= (2.45 - 2.27) \times 10\,991$
 $= \text{RM}1\,978.38$

Nilai pulangan pelaburan (saham)
Return on investment (share)

$$\begin{aligned} &= \frac{1\,978.38}{25\,000} \times 100\% \\ &= 7.91\% \end{aligned}$$

Pelaburan saham lebih menguntungkan kerana nilai pulangan pelaburannya lebih tinggi.

Share investment is more profitable because it has higher return on investment.

(b) (i) $MV = 15\,000 \left(1 + \frac{0.036}{12}\right)^{12(1)}$
 $= \text{RM}15\,549$

- (ii) Nilai pulangan pelaburan bagi simpanan tetap

Return on investment of fixed deposit

$$\begin{aligned} &= \frac{15\,549 - 15\,000}{15\,000} \times 100\% \\ &= 3.66\% \end{aligned}$$

Katakan x = harga jualan per unit bagi amanah saham

Let x = selling price per unit of the unit trust

$$\begin{aligned} 2(3.66) &= \frac{300 + 20\,000x - 15\,000}{15\,000} \times 100 \\ 1\,098 &= 300 + 20\,000x - 15\,000 \\ 20\,000x &= 15\,798 \\ x &= \text{RM}0.79 \end{aligned}$$

14. (a) Kredit ialah satu kemudahan penangguhan bayaran yang diberikan oleh pembekal kepada pengguna.

Credit is a postponement of payment facility provided by the supplier to the consumer.

- (b) Hutang membawa maksud suatu amaun yang telah dipinjam tetapi belum dilunaskan.

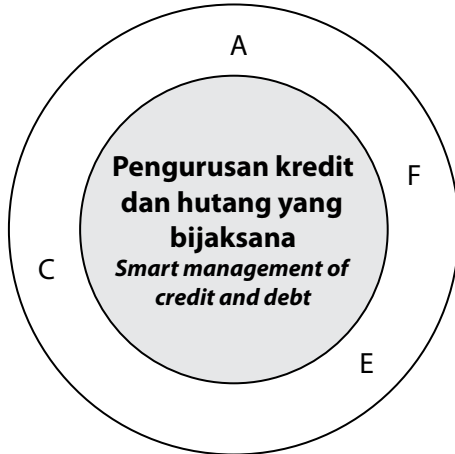
Debt means an amount that has been borrowed but has not been settled.

15.

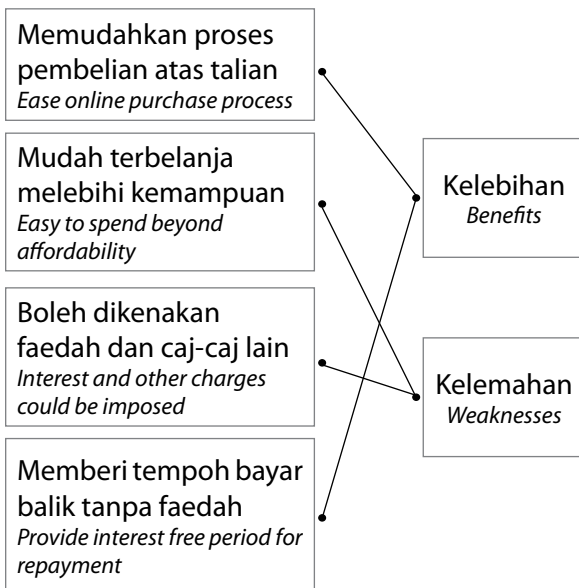
| Pernyataan Statement | B / P T / F |
|---|----------------|
| (a) Ali mendapat pinjaman perumahan daripada bank. Ali telah menampung hutang. <i>Ali got housing loan from a bank. Ali was in debt.</i> | B T |
| (b) Susan membayar balik pinjaman kereta. Susan telah menampung hutang. <i>Susan made repayment for her car loan. Susan borne debt.</i> | P F |

| | |
|---|--------|
| (c) Haris mendapat pinjaman peribadi daripada bank. Haris telah menerima kredit. <i>Haris got the personal loan from a bank. Haris received credit.</i> | B T |
| (d) Adam membuat pembayaran balik ke atas pinjaman keretanya. Adam telah menyelesaikan hutang. <i>Adam made repayment for his car loan. Adam cleared his debt.</i> | B T |

16.



17.



18. C

19. (a) Baki belum jelas / *Outstanding balance*
= RM1 500

Caj kewangan/ *Finance charge*

$$= \text{RM}1\,500 \times \left(\frac{18}{100}\right) \times \left(\frac{35}{365}\right)$$

$$= \text{RM}25.89$$

Caj bayaran lewat/ *Late payment charge*

$$= \left(\frac{1}{100}\right) \times (\text{RM}1\,500 + \text{RM}25.89)$$

$$= \text{RM}15.26$$

(b) Baki belum jelas/ *Outstanding balance*

$$= \text{RM}2\,000 - \text{RM}100$$

$$= \text{RM}1\,900$$

Caj kewangan/ *Finance charge*

$$= \text{RM}2\,000 \times \frac{1.5}{100} \times \frac{14}{30} + \text{RM}1\,900 \times \frac{1.5}{100} \times \frac{18}{30}$$

$$= \text{RM}14 + \text{RM}17.10$$

$$= \text{RM}31.10$$

Caj bayaran lewat/ *Late payment charge* = RM0

Jumlah terkini pada penyata bulan Mei

Current amount in May statement

$$= \text{RM}1\,900 + \text{RM}31.10 + \text{RM}0$$

$$= \text{RM}1\,931.10$$

(c) (i) Baki belum jelas/ *Outstanding balance*
= RM3 500

Caj kewangan/ *Finance charge*
 $= \text{RM}3\,500 \times \frac{18}{100} \times \frac{35}{365}$
 $= \text{RM}60.41$

Caj bayaran lewat/ *Late payment charge*
 $= \frac{1}{100} \times (\text{RM}3\,500 + \text{RM}60.41)$
 $= \text{RM}35.60$

Jumlah terkini pada penyata bulan Ogos
Current amount in August statement
 $= \text{RM}3\,500 + \text{RM}60.41 + \text{RM}35.60$
 $= \text{RM}3\,596.01$

(ii) Beza/ *Difference* = $\text{RM}3\,596.01 - \text{RM}3\,500$
 $= \text{RM}96.01$

(iii) Kebaikan/ *Benefit*:
 Sharmila tidak perlu membawa tunai yang banyak.
Sharmila does not need to carry a lot of cash.

Kelemahan/ *Weakness*:
 Sharmila terpaksa menanggung faedah yang lebih tinggi apabila dia tidak dapat membuat bayaran balik.
Sharmila bears higher interest when she cannot make a repayment
 (Mana-mana jawapan lain yang sesuai)
 (Any other possible answers)

20. (a) faedah akan dikenakan dan jumlah yang perlu dibayarnya akan bertambah jika dibandingkan dengan harga asal barangan atau perkhidmatan yang diperolehi,
interest will be charged and the amount he/ she needs to pay will be increased if compared with the original price of the goods or services received,

(b) dia akan mengambil tempoh yang lebih panjang untuk menyelesaikan hutang kad kredit.
 he/ she will take longer period to settle the credit card debt.

21. (a) Prinsipal, *P/ Principal, P* = $80\,000 - 8\,000$
 $= \text{RM}72\,000$
 Jumlah bayaran balik/ *Total repayment*
 $= P + Prt$
 $= 72\,000 + (72\,000 \times 0.04 \times 8)$
 $= \text{RM}95\,040$

(b) Jumlah bayaran balik/ *Total repayment*
 $= 100\,000 + (100\,000 \times 0.05 \times 9)$
 $= \text{RM}145\,000$

Bayaran ansuran/ *Instalment* = $\frac{145\,000}{9 \times 12}$
 $= \text{RM}1\,342.59$

22.

| | Bulan pertama <i>First month</i> | Bulan kedua <i>Second month</i> | Bulan ketiga <i>Third month</i> |
|---|--|---|---|
| Jumlah baki pinjaman pada awal bulan <i>Balance of the loan at the beginning of the month</i> | RM20 000 | 20 000 + 91.67 - 425 = RM19 666.67 | 19 666.67 + 90.14 - 425 = RM19 331.81 |
| Faedah Interest | $20\,000 \times \frac{0.055}{12}$ = RM91.67 | $19\,666.67 \times \frac{0.055}{12}$ = RM90.14 | $19\,331.81 \times \frac{0.055}{12}$ = RM88.60 |

23. (a) Jumlah faedah/ *Total interest*
 $= 20\,000 \times \frac{5}{100} \times 7$
 $= \text{RM}7\,000$

(b) (i) Jumlah bayaran balik/ *Total repayment*
 $= 40\,000 + (40\,000 \times 0.055 \times 6)$
 $= \text{RM}53\,200$

Bayaran ansuran/ *Instalment*
 $= \frac{53\,200}{6 \times 12}$
 $= \text{RM}738.89$

(ii) Jumlah bayaran balik/ *Total repayment*
 $= 40\,000 + (40\,000 \times 0.055 \times 5)$
 $= \text{RM}51\,000$

Bayaran ansuran/ *Instalment*
 $= \frac{51\,000}{5 \times 12}$
 $= \text{RM}850$

Wang yang perlu ditambah
Money to be added
 $= 850 - 738.89$
 $= \text{RM}111.11$

(c) (i) Jumlah bayaran balik/ *Total repayment*
 $= 60\,000 + (60\,000 \times 0.06 \times 8)$
 $= \text{RM}88\,800$

Bayaran ansuran/ *Instalment*
 $= \frac{88\,800}{8 \times 12}$

$$= \text{RM}925$$

- (ii) Katakan t = tempoh bayaran balik baharu dalam tahun

Let t = new loan repayment period in years

$$925 + 175 = \frac{60\,000 + (60\,000 \times 0.06 \times t)}{t \times 12}$$

$$13\,200t = 60\,000 + 3\,600t$$

$$9\,600t = 60\,000$$

$$t = 6.25$$

(d) (i) $\frac{1}{4} \times 5\,400 = \frac{\text{Jumlah bayaran balik}}{8 \times 12}$

$$1\,350 = \frac{\text{Jumlah bayaran balik}}{96}$$

Jumlah bayaran balik/ Total repayment

$$= \text{RM}129\,600$$

Katakan r = kadar faedah tahunan

Let r = yearly interest rate

$$129\,600 = 90\,000 + (90\,000 \times r \times 8)$$

$$720\,000r = 39\,600$$

$$r = 0.055$$

$$= 5.5\%$$

- (ii) Jumlah bayaran balik/ Total repayment

$$= 90\,000 + (90\,000 \times 0.045 \times 7)$$

$$= \text{RM}118\,350$$

Bayaran ansuran/ Instalment

$$= \frac{118\,350}{7 \times 12}$$

$$= \text{RM}1\,408.93$$

Tidak boleh. Hal ini demikian kerana bayaran ansuran bulanan melebihi $\frac{1}{4}$ daripada gaji bulanannya.

Cannot. This is because monthly instalment exceeds $\frac{1}{4}$ of his monthly income.

- (e) (i) Jumlah bayaran balik
Total repayment
 $= 80\,000 + (80\,000 \times 0.028 \times 8)$
 $= \text{RM}97\,920$

Bayaran ansuran/ Instalment

$$= \frac{97\,920}{8 \times 12}$$

$$= \text{RM}1\,020$$

- (ii) $940 = \frac{\text{Jumlah bayaran balik}}{7 \times 12}$

$$940 = \frac{\text{Total repayment}}{7 \times 12}$$

Jumlah bayaran balik

Total repayment

$$= 940 \times 7 \times 12$$

$$= \text{RM}78\,960$$

Katakan P = pinjaman yang boleh dibuat,

Let P = the loan amount that can be made,

$$78\,960 = P + (P \times 0.028 \times 7)$$

$$78\,960 = 1.196P$$

$$P = \text{RM}66\,020.07$$

Power PT3

Bahagian

- Akaun simpanan tetap
Fixed deposit account
Jawapan/ Answer: **C**
- amanah saham
unit trusts
Jawapan/ Answer: **D**
- $\text{RM}16\,000 \times 2\%$
 $= \text{RM}16\,000 \times 0.02$
 $= \text{RM}320$
Jawapan/ Answer: **A**
- Simpanan tetap
Fixed deposits
Jawapan/ Answer: **C**
- Jumlah bayaran/Total amount
 $= \text{RM}12\,000 + \text{RM}12\,000 \times 5\% \times 8$
 $= \text{RM}16\,800$
Jawapan/ Answer: **D**
- Katakan jumlah pulangan Hasmawi ialah RMP.
Let the total return of Hasmawi is RMP
 $\frac{P}{20\,000} \times 100\% = 45\%$
 $P = 9\,000$
Jawapan/ Answer: **B**

Bahagian B

7. (a) (✓)
 (b) (X)
 (c) (✓)
 (d) (✓)

8.

| Jenis pelaburan <i>Type of investment</i> | Tahap risiko <i>Risk level</i> | Tahap pulangan <i>Return level</i> | Tahap kecairan <i>Liquidity level</i> |
|--|-----------------------------------|---------------------------------------|--|
| Simpanan <i>Savings</i> | Bebas risiko <i>Risk free</i> | Rendah <i>Low</i> | Tinggi <i>High</i> |
| Hartanah <i>Real estate</i> | Rendah <i>Low</i> | Tinggi <i>High</i> | Rendah <i>Low</i> |
| Saham <i>Shares</i> | Tinggi <i>High</i> | Tinggi <i>High</i> | Sederhana <i>Moderate</i> |

9. (a) Nilai pulangan pelaburan
Return on investment
 (b) Strategi pemurataan
Cost averaging strategy
 (c) Faedah sama rata
Flat interest
 (d) Faedah atas baki
Interest on balance

Bahagian C

10. (a) (i) Jumlah bilangan unit amanah saham P yang dibeli oleh Encik Mohamad
Total number of units of unit trust bought by Encik Mohamad

$$= \frac{12 \times \text{RM}400}{\text{RM}0.75}$$

$$= 6\,400 \text{ unit/units}$$
 (ii) Jumlah dividen yang diterima oleh Encik Mohamad
Total dividend received by Encik Mohamad

$$= 6\,400 \times \text{RM}0.095$$

$$= \text{RM}608$$
 (b) Nilai matang / *Maturity value*

$$= \text{RM}40\,000 \left(1 + \frac{0.03}{3}\right)^{(3)(3)}$$

$$= \text{RM}43\,747.41$$
 (c) Pinjaman yang dibuat / *Borrowing amount*

$$= 95\% \times \text{RM}98\,000$$

$$= \text{RM}93\,100$$

Jumlah pinjaman yang perlu dibayar
Total loan needed to pay

$$= \text{RM}93\,100 + \text{RM}93\,100 \times 2.85\% \times 7$$

$$= \text{RM}111\,673.45$$

11. (a) Katakan $t = \text{masa}$ / *Let $t = \text{time}$,*

$$2(5\,000) = 5\,000 + (5\,000)(0.02)(t)$$

$$10\,000 = 5\,000 + 100t$$

$$100t = 5\,000$$

$$t = 50 \text{ tahun/ } 50 \text{ years}$$

- (b) Jumlah bayaran balik
Total repayment

$$= 1\,576.40 \times 12 \times 10$$

$$= \text{RM}189\,168$$

Katakan $r = \text{kadar faedah tahunan}$,
Let $r = \text{yearly interest rate}$,

$$189\,168 = 150\,000 + 150\,000(r)(10)$$

$$r = \frac{189\,168 - 150\,000}{150\,000(10)}$$

$$= 0.026$$

$$= 2.6\%$$

- (c) Tempoh dikenakan caj kewangan
Period subject to financial charges
 17 Jan → 17 Feb

$$= 11 \text{ hari / days}$$

Caj kewangan / *Financial charge*

$$= \text{RM}4\,800 \times 15\% \times \frac{11}{365}$$

$$= \text{RM}21.70$$

Caj bayaran lewat
Late payment charge

$$= 1\% \times (\text{RM}4\,800 + \text{RM}21.70)$$

$$= 1\% \times (\text{RM}4\,821.70)$$

$$= \text{RM}48.22$$

Baki tertunggak pada penyata Februari
Outstanding balance on February statement
 = RM4 800 + RM21.70 + RM48.22
 = RM4 869.92

12. (a) Peratus hibah
Percentage of hibah

$$= \frac{\text{RM}624}{\text{RM}24\,000} \times 100\%$$

$$= 2.6\%$$

- (b) Jumlah bayar balik / *Total repayment*
 = RM1 000 × 12 × 7
 = RM84 000

Katakan amaun maksimum yang dipinjam ialah RMP.

Let the maximum loan amount be RMP.

$$P + P \times 2.8\% \times 7 = 84\,000$$

$$P + 0.196P = 84\,000$$

$$1.196P = 84\,000$$

$$P = \text{RM}70\,234.11$$

- (c) Faedah bulan yang pertama
First month interest

$$= \text{RM}480\,000 \times 5.4\% \times \frac{1}{12}$$

$$= \text{RM}2\,160$$

Jumlah pinjaman pada akhir bulan pertama
Loan at the end of first month
 = RM480 000 + RM2 160
 = RM482 160

Baki selepas bayaran ansuran bulan pertama
Balance after first instalment
 = RM482 160 – RM2 695.35
 = RM479 464.65

Faedah bulan yang kedua
Second month interest
 = RM479 464.65 × 5.4% × $\frac{1}{12}$
 = RM2 157.59

Jumlah faedah bagi dua bulan yang pertama
Total interest for the first two months
 = RM2 160 + RM2 157.59
 = RM4 317.59

Power KBAT

1. Syarikat P/ *Company P*:
 Harga promosi = RM89
Promotional price

Harga sebenar yang akan dibayar = RM89 + RM8
Actual price to be paid = RM97

JAWAPAN

BAB 4

Lukisan Berskala Scale Drawings

1.

| | Ukuran pada lukisan <i>Measurement on drawing</i> | Ukuran sebenar objek <i>Actual measurement of object</i> | Nisbah ukuran pada lukisan kepada ukuran sebenar objek <i>Ratio of the measurement on drawing to the actual measurement of object</i> |
|-------------------------|--|---|--|
| Tinggi <i>Height</i> | 15 cm | 1.5 m | 15 cm : 1.5 m = 15 cm : 150 cm = 1 : 10 |
| Lebar <i>Width</i> | 18 cm | 1.8 m | 18 cm : 1.8 m = 18 cm : 180 cm = 1 : 10 |

Dua nisbah di atas adalah sama.
Ukuran pada lukisan adalah berkadaran
dengan ukuran sebenar objek.

The two ratios are equal. The measurement on drawing are proportional to the actual measurement of object.

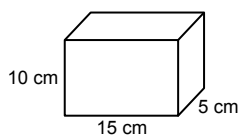
2. (a) Semua ukuran pada lukisan I, lukisan II dan lukisan III adalah berkadaran dengan ukuran pada objek ABCDEF manakala saiz sudut tidak berubah.

All measurements on the drawing I, drawing II and drawing III are proportional to the measurement of the object ABCDEF whereas angle size is unchanged.

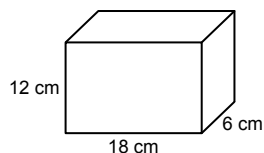
- (b) Lukisan I, lukisan II dan lukisan III ialah lukisan berskala bagi objek ABCDEF.

The drawing I, drawing II and drawing III are scale drawing of the object ABCDEF.

3.



(✓)



(✓)

4.

1 cm pada lukisan berskala mewakili 20 cm pada objek sebenar
1 cm on the scale drawing represents 20 cm on the real object

1 cm pada lukisan berskala mewakili 0.5 mm pada objek sebenar
1 cm on the scale drawing represents 0.5 mm on the real object

1 cm pada lukisan berskala mewakili 10 mm pada objek sebenar
1 cm on the scale drawing represents 10 mm on the real object

1 : 1

1 : $\frac{1}{20}$

1 : 20

5.

| Rajah <i>Diagram</i> | Skala / Scale | | |
|-------------------------|----------------|--------|---------------------|
| | Nisbah / Ratio | 1 : n | |
| II | P'Q' : PQ | 1 : 3 | 1 : 3 |
| | Q'R' : QR | 2 : 6 | 1 : 3 |
| III | P'Q' : PQ | 5 : 3 | 1 : $\frac{3}{5}$ |
| | Q'R' : QR | 10 : 6 | 1 : $\frac{3}{5}$ |
| IV | P'Q' : PQ | 2 : 3 | 1 : 1 $\frac{1}{2}$ |
| | Q'R' : QR | 4 : 6 | 1 : 1 $\frac{1}{2}$ |
| V | P'Q' : PQ | 3 : 3 | 1 : 1 |
| | Q'R' : QR | 6 : 6 | 1 : 1 |

$n > 1$

Lukisan adalah lebih kecil daripada objek.
The drawings are smaller than the objects.

1 : n

$n = 1$

Lukisan adalah sama saiz dengan objek.
The drawings are same size as the objects.

$n < 1$

Lukisan adalah lebih besar daripada objek.
The drawings are larger than the objects.

6. (a) Skala/ Scale = 21 : 84
 $= 21 \div 21 : 84 \div 21$
 $= 1 : 4$
- (b) Skala/ Scale = 1 : 1
- (c) Skala/ Scale = 4 : 3
 $= 1 : \frac{3}{4}$
- (d) Skala/ Scale = 2 : 1
 $= 1 : \frac{1}{2}$
- (e) Skala/ Scale = 0.5 : 1
 $= 1 : 2$

7. (a) $\frac{1}{40\,000} = \frac{\text{Panjang sungai pada peta}}{\text{Length of river on the map}} = \frac{2\text{ km}}{2\text{ km}}$

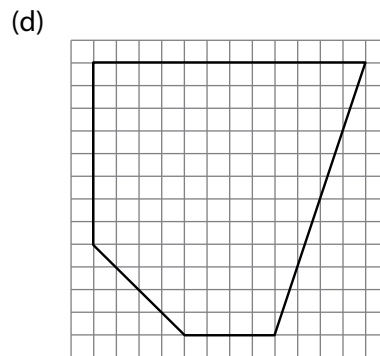
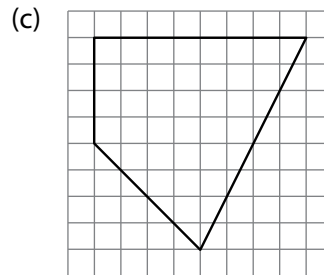
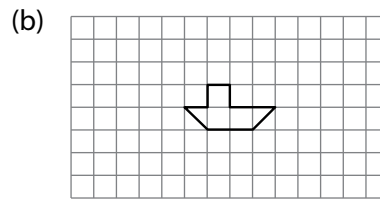
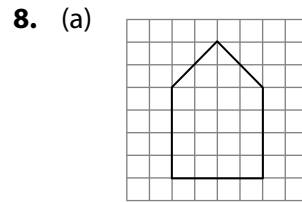
Panjang sungai pada peta
 Length of river on the map
 $= \frac{1}{40\,000} \times 2$
 $= 0.00005\text{ km}$
 $= 5\text{ cm}$

(b) $\frac{1}{4\,000} = \frac{10\text{ cm}}{\text{Panjang sebenar / Actual length}}$
 Panjang sebenar / Actual length
 $= 4\,000 \times 10$
 $= 40\,000\text{ cm}$
 $= 400\text{ m}$

(c) $\frac{1}{4} = \frac{4\text{ cm}}{\text{Panjang sebenar / Actual length}}$
 Panjang sebenar/ Actual length
 $= \frac{1}{4} \times 4$
 $= 1\text{ cm}$

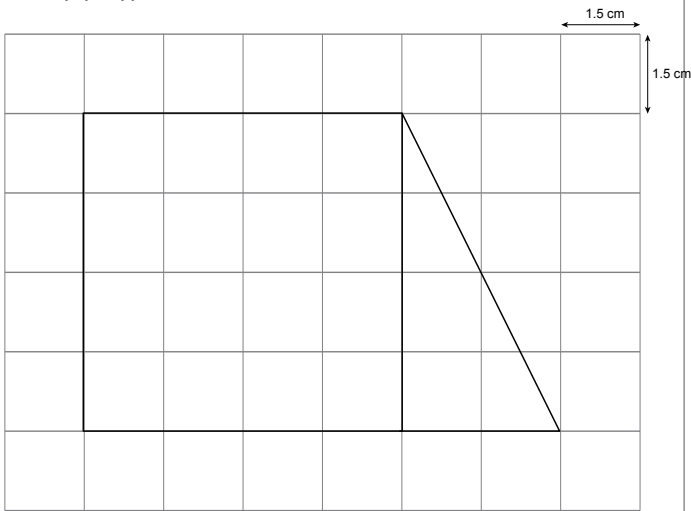
(d) $\frac{1}{3} = \frac{\text{Panjang LM pada lukisan}}{\text{Length of LM on the drawing}} = \frac{15\text{ cm}}{15\text{ cm}}$

Panjang LM pada lukisan
 Length of LM on the drawing
 $= 3 \times 15$
 $= 45\text{ cm}$



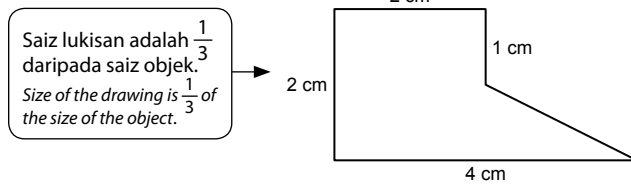
(ii) Skala yang digunakan/ Scale used
 $= 0.5\text{ cm} : 1\text{ cm}$
 $= \frac{1}{2} : 1$
 $= 1 : 2$

(b) (i)

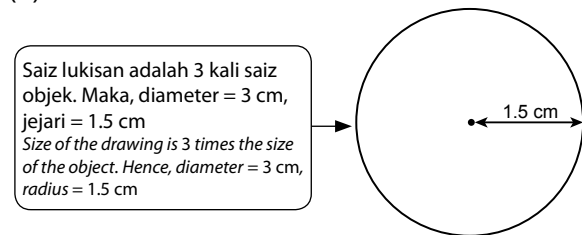


(ii) Skala yang digunakan/ Scale used
 = 1.5 cm : 1 cm
 = $\frac{3}{2}$: 1
 = 1 : $\frac{2}{3}$

10. (a)



(b)



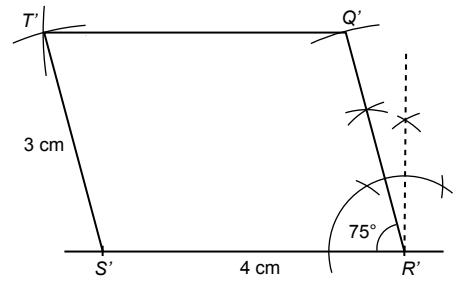
(c) $\frac{1}{2} = \frac{T'S'}{6 \text{ cm}}$

$\frac{1}{2} = \frac{T'S'}{6 \text{ cm}}$

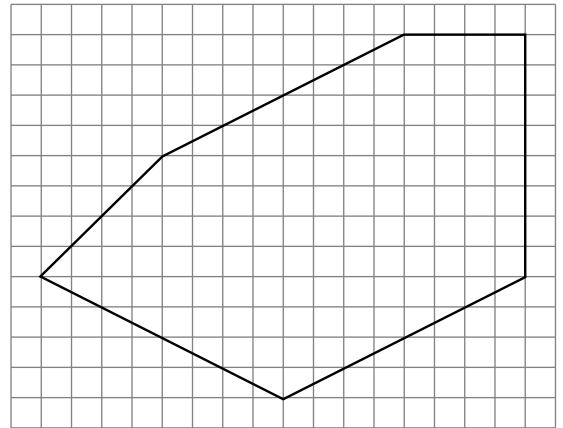
$T'S' = \frac{1}{2} \times 6$
 = 3 cm

$\frac{1}{2} = \frac{S'R'}{8 \text{ cm}}$

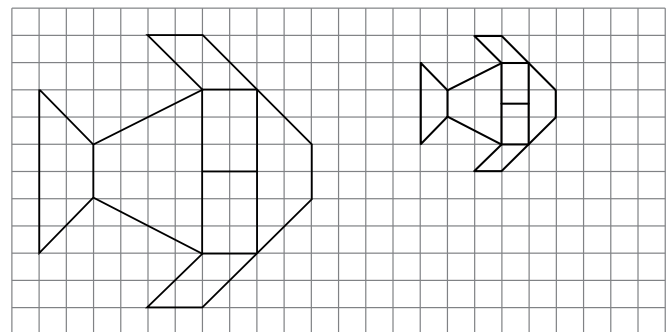
$S'R' = \frac{1}{2} \times 8$
 = 4 cm



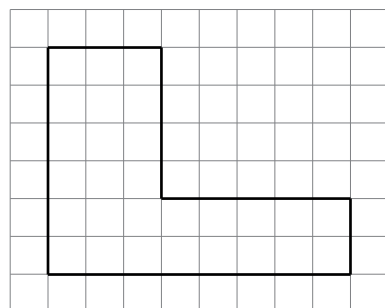
11. (a)



(b)



(c)



13. (a) $\frac{1}{3\,000\,000} = \frac{20 \text{ cm}}{\text{Jarak sebenar}}$
 Jarak sebenar = $3\,000\,000 \times 20$
 = 60 000 000 cm
 = 600 km

$\left[\frac{1}{3\,000\,000} = \frac{20 \text{ cm}}{\text{Actual distance}} \right]$
 Actual distance = $3\,000\,000 \times 20$
 = 60 000 000 cm
 = 600 km

(b) Panjang sisi PQRS = $\sqrt{36} = 6$ cm
Side length of PQRS

Panjang sisi ABCD = $\sqrt{81} = 9$ cm
Side length of ABCD

Skala = 6 : 9
Scale
 = 1 : $\frac{3}{2}$

(c) 2.5 cm dalam pelan mewakili 150 000 cm.
2.5 cm in the plan represents 150 000 cm.

4.6 cm dalam pelan mewakili
4.6 cm in the plan represents

$$\frac{4.6 \times 150\,000}{2.5}$$

= 276 000 cm

Maka, panjang sebenar lebuh raya PQ ialah 2.76 km.

Hence, the actual length of the highway PQ is 2.76 km.

(d) (i) $\frac{\text{Tinggi model}}{35 \text{ m}} = \frac{1}{500}$
 Tinggi model = $\frac{35 \times 1}{500}$
 = 0.07 m
 = 7 cm

$$\left[\begin{array}{l} \frac{\text{Height of model}}{35 \text{ m}} = \frac{1}{500} \\ \text{Height of model} = \frac{35 \times 1}{500} \\ \phantom{\text{Height of model}} = 0.07 \text{ m} \\ \phantom{\text{Height of model}} = 7 \text{ cm} \end{array} \right]$$

(ii) $\frac{20 \text{ cm}}{\text{Panjang sebenar}} = \frac{1}{500}$
 Panjang sebenar = 20×500
 = 10 000 cm
 = 100 m

$$\left[\begin{array}{l} \frac{20 \text{ cm}}{\text{Actual length}} = \frac{1}{500} \\ \text{Actual length} = 20 \times 500 \\ \phantom{\text{Actual length}} = 10\,000 \text{ cm} \\ \phantom{\text{Actual length}} = 100 \text{ m} \end{array} \right]$$

(e) $\frac{\text{Panjang lukisan}}{30.5 \text{ m}} = \frac{1}{300}$
 Panjang lukisan = $\frac{30.5 \times 1}{300}$
 = 0.102 m
 = 10.2 cm

$$\left[\begin{array}{l} \frac{\text{Drawing's length}}{30.5 \text{ m}} = \frac{1}{300} \\ \text{Drawing's length} = \frac{30.5 \times 1}{300} \\ \phantom{\text{Drawing's length}} = 0.102 \text{ m} \\ \phantom{\text{Drawing's length}} = 10.2 \text{ cm} \end{array} \right]$$

Lebar lukisan = $\frac{1}{15.25 \text{ m}} = \frac{1}{300}$
 Lebar lukisan = $\frac{15.25 \times 1}{300}$
 = 0.051 m
 = 5.1 cm

Luas lukisan = Panjang \times Lebar
Area of drawing = Length \times Width
 = 10.2 \times 5.1
 = 52.02 cm²

$$\left[\begin{array}{l} \frac{\text{Drawing's width}}{15.25 \text{ m}} = \frac{1}{300} \\ \text{Drawing's width} = \frac{15.25 \times 1}{300} \\ \phantom{\text{Drawing's width}} = 0.051 \text{ m} \\ \phantom{\text{Drawing's width}} = 5.1 \text{ cm} \end{array} \right]$$

(f) $1 : \frac{1}{4}$ bermaksud lukisan berskala adalah empat kali objek.

$1 : \frac{1}{4}$ means the scale drawing is four times the object.

Panjang tapak lukisan
Length of the drawing's base
 = 4 \times 24
 = 96 cm

Tinggi lukisan
Height of the drawing
 = 4 \times 9
 = 36 cm

Luas lukisan berskala bagi segi tiga itu
Area of the scale drawing of the triangle

$$= \frac{1}{2} \times 96 \times 36$$

= 1 728 cm²

(g) (i) Skala / Scale = 4 cm : 2 cm
 $= 1 : \frac{1}{2}$

Lukisan berskala itu adalah dua kali objeknya. Maka,
The scale drawing is twice its object. Hence,

$$\begin{aligned} 2 \times x &= 8 & x + y &= 2 \times 7 & 2 \times z &= 10 \\ x &= 4 & 4 + y &= 14 & z &= 5 \\ & & y &= 10 & & \end{aligned}$$

(ii) Isi padu / Volume = $\frac{1}{2} \times (4 + 7) \times 2 \times 5$
 $= 55 \text{ cm}^3$

Power PT3

Bahagian

1. $\frac{1}{2} = \frac{P'Q'}{2}$, $\frac{1}{2} = \frac{Q'R'}{3}$
 $P'Q' = 1 \text{ cm}$ $Q'R' = 1.5 \text{ cm}$
 Jawapan/ Answer: **B**

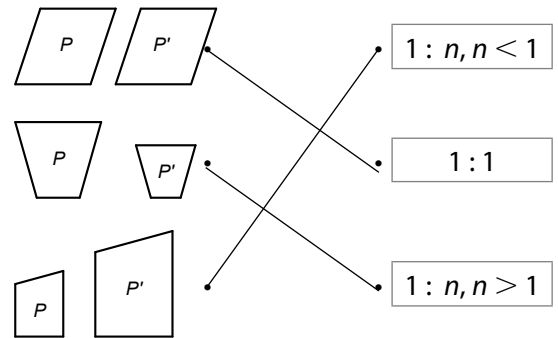
2. Segi empat tepat C bukan lukisan berskala bagi segi empat tepat P.
Rectangle C is not the scale drawing of rectangle P.
 Jawapan/ Answer: **C**

3. Skala yang digunakan / Scale used
 $= 10.5 : 3.5$
 $= 1 : \frac{3.5}{10.5}$
 $= 1 : \frac{1}{3}$
 Jawapan/ Answer: **A**

4. Lukisan berskala dan objek adalah sama saiz.
The scale drawing and the object are of equal size.
 Luas lukisan berskala / Area of the scale drawing
 $= 4 \times 4$
 $= 16 \text{ cm}^2$
 Jawapan/ Answer: **D**

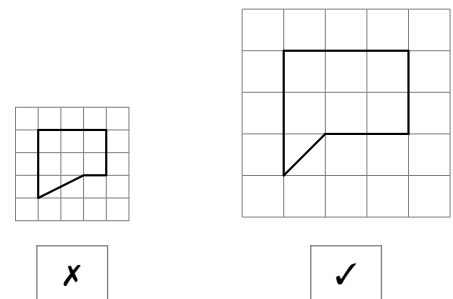
Bahagian

5. (a)



(b) Skala / Scale = 0.3 : 0.5 = $1 : \frac{5}{3}$

6. (a)



(b) 6 cm mewakili / represents 12 km
 1 cm mewakili / represents = 2 km
 4 cm mewakili / represents = 8 km
 Jarak sebenar QR ialah 8 km.
Actual distance of QR is 8 km.

7. (a) Skala / Scale = 4.5 : 27
 $= 1 : 6$

(b) (i) Jarak sebenar / Actual distance
 $= 12 \times 200\,000$
 $= 2\,400\,000 \text{ cm}$
 $= 24 \text{ km}$

(ii) Jarak pada peta / Distance on the map
 $= \frac{1\,800\,000}{200\,000}$
 $= 9 \text{ cm}$

(c) Panjang foto / Length of the photo
 $= 25 - 3 - 3$
 $= 19 \text{ cm}$
 Lebar foto / Breadth of the photo
 $= 18 - 2.5 - 2.5$
 $= 13 \text{ cm}$

Panjang lukisan berskala
Length of the scale drawing

$$= \frac{19}{\frac{1}{4}}$$

$$= 76 \text{ cm}$$

Lebar lukisan berskala
Breadth of the scale drawing

$$= \frac{13}{\frac{1}{4}}$$

$$= 52 \text{ cm}$$

8. (a) (i) Skala/ Scale = 40 cm : 20 cm

$$= 1 : \frac{1}{2}$$

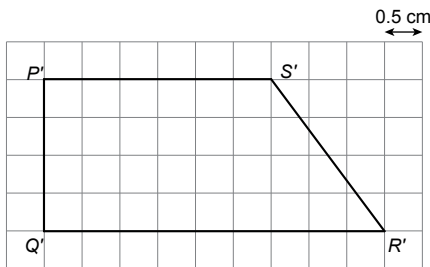
(ii) $PR = \sqrt{20^2 + 21^2}$

$$= 29 \text{ cm}$$

$$SU = \frac{29}{\frac{1}{2}}$$

$$= 58 \text{ cm}$$

(b)



(c) $\frac{1}{5} = \frac{4.5}{PQ}$ $\frac{1}{5} = \frac{3}{t}$

$$PQ = 22.5$$

$$t = 15$$

Luas segi tiga PQR/ Area of triangle PQR

$$= \frac{1}{2} \times 22.5 \times 15$$

$$= 168.75 \text{ cm}^2$$

Bahagian C

9. (a) $1 : \frac{1}{3}$ bermaksud lukisan berskala adalah tiga kali objek.
 $1 : \frac{1}{3}$ means the scale drawing is three times the object.

Panjang AB pada lukisan

Length of AB on the drawing

$$= 3 \times 5$$

$$= 15 \text{ cm}$$

Panjang BC pada lukisan

Length of BC on the drawing

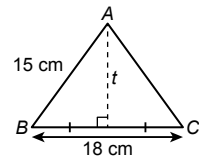
$$= 3 \times 6$$

$$= 18 \text{ cm}$$

$$t = \sqrt{15^2 - 9^2}$$

$$= \sqrt{144}$$

$$= 12 \text{ cm}$$



Luas segi tiga pada lukisan

Area of the triangle in the drawing

$$= \frac{1}{2} \times 18 \times 12$$

$$= 108 \text{ cm}^2$$

- (b) $1 : 150$ bermaksud 1 cm pada pelan mewakili 150 cm pada lantai
 $1 : 150$ means 1 cm on the plan representing 150 cm on the floor

Panjang sebenar

Actual length

$$= 2.4 \times 150$$

$$= 360 \text{ cm}$$

$$= 3.6 \text{ m}$$

Lebar sebenar

Actual width

$$= 1.6 \times 150$$

$$= 240 \text{ cm}$$

$$= 2.4 \text{ m}$$

Luas sebenar bilik A

Actual area of room A

$$= 3.6 \times 2.4$$

$$= 8.64 \text{ m}^2$$

(c) (i)
$$\frac{10 \text{ cm}}{\text{Jarak sebenar / Actual distance}} = \frac{1}{80\,000}$$

$$\text{Jarak sebenar / Actual distance}$$

$$= 80\,000 \times 10$$

$$= 800\,000 \text{ cm}$$

$$= 8 \text{ km}$$

(ii) Masa yang diambil / Time taken
 $= 8 \times 30$
 $= 240 \text{ minit / 240 minutes}$
 $= 4 \text{ jam / 4 hours}$

Maka, Akmal akan sampai ke stesen Y pada pukul 11:00 a.m.
 Hence, Akmal will reach the station Y at 11:00 a.m.

Power KBAT

1.
$$\frac{1}{5\,000} = \frac{\text{Ukuran lukisan berskal / Scale drawing's measurement}}{\text{Ukuran objek / Object's measurement}}$$

Maka, ukuran sebenar

Hence, the actual measurement of

$$PS = 5\,000 \times 4 = 20\,000 \text{ cm} = 200 \text{ m}$$

$$PQ = 5\,000 \times 1.68 = 8\,400 \text{ cm} = 84 \text{ m}$$

$$SV = 5\,000 \times 1.5 = 7\,500 \text{ cm} = 75 \text{ m}$$

(a) 1 minit 29 saat = 60 saat + 29 saat = 89 saat
 1 minute 29 seconds = 60 seconds + 29 seconds
 $= 89 \text{ seconds}$

Jarak dari W ke V / Distance from W to V

$$= \sqrt{WS^2 + SV^2}$$

$$= \sqrt{100^2 + 75^2} \leftarrow \begin{matrix} WS = 200 \div 2 \\ = 100 \text{ m} \end{matrix}$$

$$= 125 \text{ m}$$

Laju / Speed = $\frac{\text{Jarak / Distance}}{\text{Masa / Time}}$

$$= \frac{125}{89}$$

$$= 1.4 \text{ m s}^{-1}$$

(b) Panjang pagar / Length of fence
 $= \text{perimeter } QTU + \text{perimeter } VSW$
 $= QT + QU + UT + WS + SV + WV$
 $= 42 + 42 + \left(\frac{90}{360} \times 2 \times \frac{22}{7} \times 42 \right) +$

$$100 + 75 + 125 \leftarrow QT = 84 \div 2 = 42 \text{ m}$$

$$= 42 + 42 + 66 + 100 + 75 + 125$$

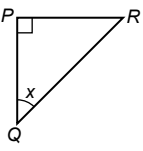
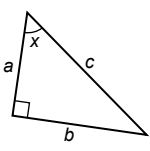
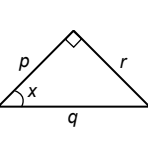
$$= 450 \text{ m}$$

JAWAPAN

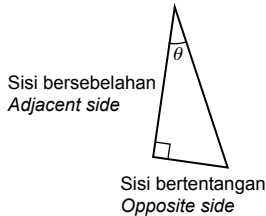
BAB 5

Nisbah Trigonometri Trigonometric Ratios

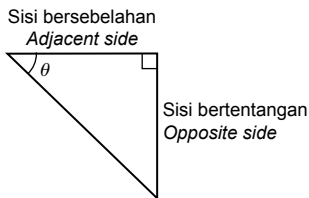
1.

| | | | |
|---|---|---|---|
| Segi tiga bersudut tegak <i>Right-angled triangle</i> |  |  |  |
| Sisi bertentangan <i>Opposite side</i> | <i>PR</i> | <i>b</i> | <i>r</i> |
| Sisi bersebelahan <i>Adjacent side</i> | <i>PQ</i> | <i>a</i> | <i>p</i> |

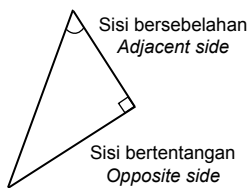
2. (a)



(b)



(c)



3. (a)

| | <i>PST</i> | <i>PUV</i> | <i>PWX</i> | |
|--|---|------------------------------|-------------------------------|-------------------------------|
| Nisbah panjang/ Ratio of length | sisi bertentangan hipotenus <i>opposite side</i> <i>hypotenuse</i> | $\frac{8}{10} = \frac{4}{5}$ | $\frac{12}{15} = \frac{4}{5}$ | $\frac{16}{20} = \frac{4}{5}$ |
| | sisi bersebelahan hipotenus <i>adjacent side</i> <i>hypotenuse</i> | $\frac{6}{10} = \frac{3}{5}$ | $\frac{9}{15} = \frac{3}{5}$ | $\frac{12}{20} = \frac{3}{5}$ |
| | sisi bertentangan sisi bersebelahan <i>opposite side</i> <i>adjacent side</i> | $\frac{8}{6} = \frac{4}{3}$ | $\frac{12}{9} = \frac{4}{3}$ | $\frac{16}{12} = \frac{4}{3}$ |

(b) (i) Dalam segi tiga bersudut tegak yang serupa, nisbah panjang sisi yang sepadan adalah tetap.

In similar right-angled triangles, the ratios of corresponding sides are constant.

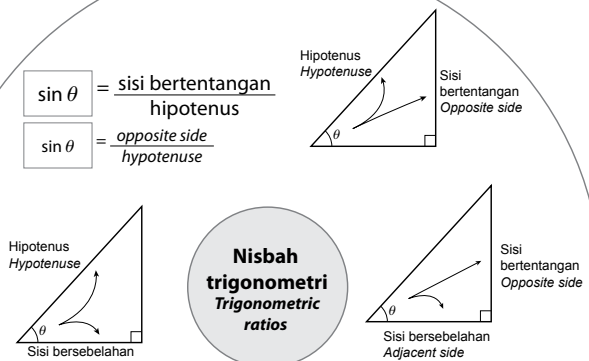
(ii) Nisbah ini tidak berubah apabila saiz segi tiga berubah secara berkadaran.

These ratios do not change when the size of the triangle varies proportionally.

(iii) Nisbah panjang pasangan sisi suatu segi tiga bersudut tegak dikenali sebagai nisbah trigonometri.

The ratios between pairs of side lengths in right-angled triangles are called trigonometric ratios.

4.



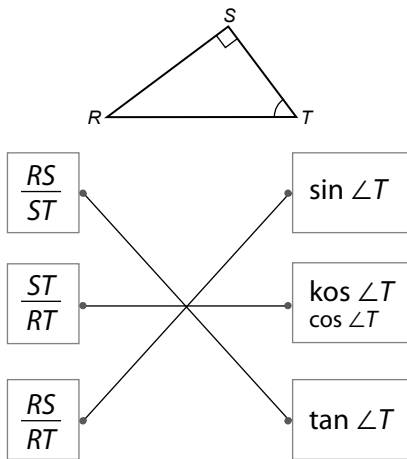
$\sin \theta = \frac{\text{sisi bertentangan}}{\text{hipotenus}}$
 $\sin \theta = \frac{\text{opposite side}}{\text{hypotenuse}}$

$\cos \theta = \frac{\text{sisi bersebelahan}}{\text{hipotenus}}$
 $\cos \theta = \frac{\text{adjacent side}}{\text{hypotenuse}}$

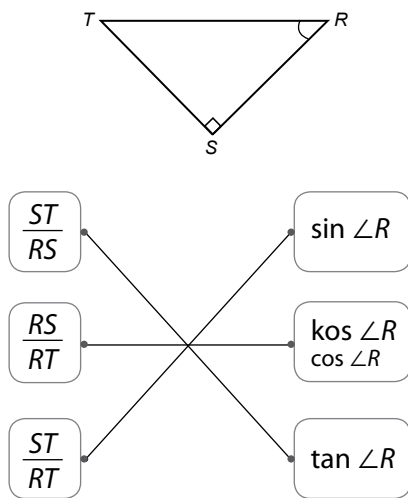
$\tan \theta = \frac{\text{sisi bertentangan}}{\text{sisi bersebelahan}}$
 $\tan \theta = \frac{\text{opposite side}}{\text{adjacent side}}$

Nisbah trigonometri
Trigonometric ratios

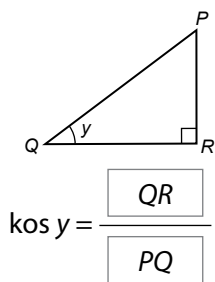
5. (a)



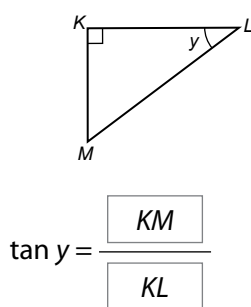
(b)



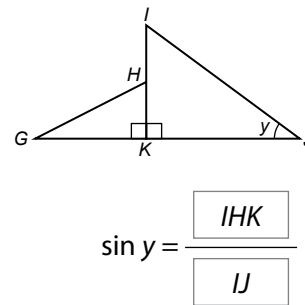
6. (a)



(b)



(c)

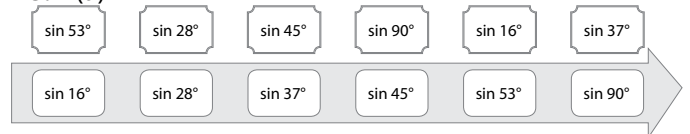


7. (a)

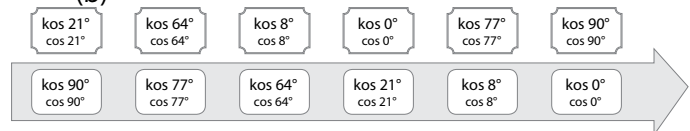
| Segi tiga Triangle | Sudut tirus Acute angle | Nisbah panjang (kepada dua tempat perpuluhan) Ratio of length (to two decimal places) | | |
|-----------------------|----------------------------------|---|--|--|
| | | sisi bertentangan hipotenus <i>opposite side hypotenuse</i> | sisi bersebelahan hipotenus <i>adjacent side hypotenuse</i> | sisi bertentangan sisi bersebelahan <i>opposite side adjacent side</i> |
| DEF | 50° | $\frac{7.7}{10} = 0.77$ | $\frac{6.4}{10} = 0.64$ | $\frac{7.7}{6.4} = 1.20$ |
| GHJ | 70° | $\frac{9.4}{10} = 0.94$ | $\frac{3.4}{10} = 0.34$ | $\frac{9.4}{3.4} = 2.76$ |

- (b)
- nilai sinus bagi sudut itu (berkurang, bertambah)
the value of sine of the angle (decreases, increases)
 - nilai kosinus bagi sudut itu (berkurang, bertambah)
the value of cosine of the angle (decreases, increases)
 - nilai tangen bagi sudut itu (berkurang, bertambah)
the value of tangent of the angle (decreases, increases)

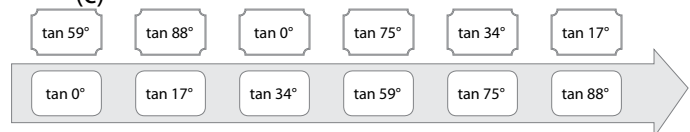
8. (a)



(b)



(c)



9. (a) (i) $\sin w = \frac{3}{5}$
 (ii) $\frac{\cos w}{\cos w} = \frac{4}{5}$
 (iii) $\tan w = \frac{3}{4}$
 (iv) $\sin x = \frac{5}{13}$
 (v) $\frac{\cos x}{\cos x} = \frac{12}{13}$
 (vi) $\tan x = \frac{5}{12}$
 (vii) $\sin y = \frac{8}{17}$
 (viii) $\frac{\cos y}{\cos y} = \frac{15}{17}$
 (ix) $\tan y = \frac{8}{15}$
 (x) $\sin z = \frac{10}{26} = \frac{5}{13}$
 (xi) $\frac{\cos z}{\cos z} = \frac{24}{26} = \frac{12}{13}$
 (xii) $\tan z = \frac{10}{24} = \frac{5}{12}$

(b) $\triangle DEF$ dan $\triangle LMN$ adalah berkadaran. Nisbah trigonometri bagi sudut x dan sudut z adalah sama.

$\triangle DEF$ and $\triangle LMN$ are proportional. The trigonometric ratios of the angle x and angle z are equal.

10. (a) $\sin \theta = \frac{5}{13}$
 (b) $\sin \theta = \frac{9}{41}$
 (c) $\sin \theta = \frac{21}{29}$
 (d) $BC = \sqrt{25^2 - 24^2}$
 $= 7 \text{ cm}$
 $\sin \theta = \frac{7}{25}$
 (e) $QR = \sqrt{17^2 - 8^2}$
 $= 15 \text{ cm}$
 $\sin \theta = \frac{15}{17}$

11. (a) $\frac{\cos \theta}{\cos \theta} = \frac{15}{17}$
 (b) $KM = \sqrt{15^2 + 8^2}$
 $= 17 \text{ cm}$
 $\frac{\cos \theta}{\cos \theta} = \frac{15}{17}$
 (c) $SQ = \sqrt{13^2 - 12^2}$
 $= 5 \text{ cm}$
 $\frac{\cos \theta}{\cos \theta} = \frac{5}{10}$
 $= \frac{1}{2}$
 (d) $AC = \sqrt{25^2 - 24^2}$
 $= 7 \text{ cm}$
 $\frac{\cos \theta}{\cos \theta} = \frac{7}{25}$
 (e) $KH = \sqrt{13^2 - 5^2} = 12 \text{ cm}$
 $KI = KH + HI = 24 \text{ cm}$
 $JI = \sqrt{7^2 + 24^2} = 25 \text{ cm}$
 $\frac{\cos \theta}{\cos \theta} = \frac{24}{25}$
12. (a) $\tan \theta = \frac{12}{9}$
 $= \frac{4}{3}$
 (b) $QR = \sqrt{13^2 - 5^2}$
 $= 12 \text{ cm}$
 $\tan \theta = \frac{12}{5}$
 (c) $LM = \sqrt{17^2 - 15^2}$
 $= 8 \text{ cm}$
 $\tan \theta = \frac{8}{15}$
 (d) $KL = \sqrt{0.41^2 - 0.40^2}$
 $= 0.09 \text{ m}$
 $\tan \theta = \frac{0.40}{0.09}$
 $= \frac{40}{9}$
 (e) $PR = QR$
 $= 8 \text{ cm}$
 $\tan \theta = \frac{8}{8}$
 $= 1$

$$14. (a) \tan \theta = \frac{0.28}{0.96}$$

$$= \frac{7}{24}$$

$$(b) \tan \theta = \frac{\sqrt{51}}{\frac{10}{7}}$$

$$= \frac{\sqrt{51}}{7}$$

$$15. (a) \sin x = \frac{5}{6}$$

$$\frac{15}{y} = \frac{5}{6}$$

$$y = 18$$

$$(b) \sin x = \frac{4}{9}$$

$$\frac{y}{18} = \frac{4}{9}$$

$$y = 8$$

$$(c) \cos x = \frac{5}{8} \quad (\cos x = \frac{5}{8})$$

$$\frac{15}{y} = \frac{5}{8}$$

$$y = 24$$

$$(d) \cos x = \frac{3}{11} \quad (\cos x = \frac{3}{11})$$

$$\frac{y}{33} = \frac{3}{11}$$

$$y = 9$$

$$(e) \tan x = \frac{3}{5}$$

$$\frac{y}{20} = \frac{3}{5}$$

$$y = 12$$

$$(f) \tan x = \frac{8}{9}$$

$$\frac{16}{y} = \frac{8}{9}$$

$$y = 18$$

$$16. (a) \cos x = \frac{24}{PR} \quad (\cos x = \frac{24}{PR})$$

$$0.96 = \frac{24}{PR}$$

$$PR = 25 \text{ cm}$$

$$QR = \sqrt{25^2 - 24^2}$$

$$= 7 \text{ cm}$$

$$(i) \sin x = \frac{7}{25}$$

$$(ii) \tan x = \frac{7}{24}$$

$$(b) \tan x = \frac{TU}{16}$$

$$\frac{TU}{16} = \frac{3}{4}$$

$$TU = 12 \text{ cm}$$

$$SU = \sqrt{16^2 + 12^2}$$

$$= 20 \text{ cm}$$

$$(i) \sin x = \frac{12}{20}$$

$$= \frac{3}{5}$$

$$(ii) \cos x = \frac{16}{20} \quad (\cos x = \frac{16}{20})$$

$$= \frac{4}{5}$$

$$(c) \sin \theta = \frac{9}{BD}$$

$$\frac{3}{8} = \frac{9}{BD}$$

$$BD = 24 \text{ cm}$$

$$AD = \sqrt{25^2 - 24^2}$$

$$= 7 \text{ cm}$$

$$(i) \tan x = \frac{24}{7}$$

$$(ii) \cos x = \frac{7}{25} \quad (\cos x = \frac{7}{25})$$

$$(d) \tan y = \frac{KN}{8}$$

$$\frac{KN}{8} = 1$$

$$KN = 8 \text{ cm}$$

$$MN = \sqrt{17^2 - 8^2}$$

$$= 15 \text{ cm}$$

$$\tan \angle MKN = \frac{15}{8}$$

$$17. (a) (i) \quad BC = \sqrt{10^2 - 6^2} \\ = 8 \text{ cm}$$

$$\cos x = \frac{BC}{BD} \quad (\cos x = \frac{BC}{BD}) \\ = \frac{8}{10} \\ = \frac{4}{5}$$

$$(ii) \quad AC = 2 \times 8 \\ = 16 \text{ cm}$$

$$\tan y = \frac{DC}{AC} \\ = \frac{6}{16} \\ = \frac{3}{8}$$

$$(b) (i) \quad \cos x = \frac{AC}{17} \quad (\cos x = \frac{AC}{17})$$

$$\frac{AC}{17} = \frac{15}{17} \\ AC = 15 \text{ cm}$$

$$AD = \sqrt{17^2 - 15^2} \\ = 8 \text{ cm}$$

$$\tan x = \frac{AD}{AC} \\ = \frac{8}{15}$$

$$(ii) \quad BC = \sqrt{15^2 - 12^2} \\ = 9 \text{ cm}$$

$$\sin y = \frac{BC}{AC} \\ = \frac{9}{15} \\ = \frac{3}{5}$$

$$(c) (i) \quad JM = \sqrt{13^2 - 5^2} \\ = 12 \text{ cm}$$

$$\sin x = \frac{JM}{NJ} \\ = \frac{12}{13}$$

$$(ii) \quad MK = \sqrt{37^2 - 12^2} \\ = 35 \text{ cm}$$

$$\tan y = \frac{MK}{JM} \\ = \frac{35}{12}$$

$$(d) (i) \quad \cos y = \frac{QS}{17} \quad (\cos y = \frac{QS}{17})$$

$$\frac{QS}{17} = \frac{15}{17} \\ QS = 15 \text{ cm}$$

$$QR = \sqrt{17^2 - 15^2} \\ = 8 \text{ cm}$$

$$PR = 2 \times 8 \\ = 16 \text{ cm}$$

$$(ii) \quad QT = 15 - 9 \\ = 6 \text{ cm}$$

$$PT = \sqrt{8^2 + 6^2} \\ = 10 \text{ cm}$$

$$\sin x = \frac{QT}{PT} \\ = \frac{6}{10} \\ = \frac{3}{5}$$

$$(e) (i) \quad \sin y = \frac{BE}{17}$$

$$\frac{BE}{17} = \frac{15}{17}$$

$$BE = 15 \text{ cm} \\ DE = 6 + 15 \\ = 21 \text{ cm}$$

$$(ii) \quad \tan x = \frac{6}{BC}$$

$$\frac{6}{BC} = \frac{3}{4}$$

$$BC = 8 \text{ cm}$$

$$CD = \sqrt{6^2 + 8^2} \\ = 10 \text{ cm}$$

$$\sin x = \frac{BD}{CD} \\ = \frac{6}{10} = \frac{3}{5}$$

$$(f) (i) \quad BD = \sqrt{13^2 - 5^2} \\ = 12 \text{ cm}$$

$$BE = 2 \times 12 \\ = 24 \text{ cm}$$

$$AB = \sqrt{25^2 - 24^2} \\ = 7 \text{ cm}$$

$$AC = AB + BC \\ = 7 + 5 \\ = 12 \text{ cm}$$

$$(ii) \tan x = \frac{AB}{BE}$$

$$= \frac{7}{24}$$

$$(iii) \cos y = \frac{BD}{CD} \quad (\cos y = \frac{BD}{CD})$$

$$= \frac{12}{13}$$

18.

| | | | | | | | |
|------------------|----------------------|------------------|----------------------|----------------------|------------------|----------------------|----------------------|
| $\sin 30^\circ$ | $\cos 45^\circ$ | $\tan 60^\circ$ | $\sin 60^\circ$ | $\cos 30^\circ$ | $\tan 45^\circ$ | $\sin 45^\circ$ | $\tan 30^\circ$ |
| \triangle_{as} | \triangle_{as} | \triangle_{as} | \triangle_{as} | \triangle_{as} | \triangle_{as} | \triangle_{as} | \triangle_{as} |
| $\frac{1}{2}$ | $\frac{1}{\sqrt{2}}$ | $\sqrt{3}$ | $\frac{\sqrt{3}}{2}$ | $\frac{\sqrt{3}}{2}$ | 1 | $\frac{1}{\sqrt{2}}$ | $\frac{1}{\sqrt{3}}$ |

19. (a) $\sin 45^\circ + \cos 45^\circ$
 $\sin 45^\circ + \cos 45^\circ$

$$= \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}$$

$$= \frac{2}{\sqrt{2}} = \sqrt{2} \quad \leftarrow \frac{2}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{2} = \sqrt{2}$$

(b) $\cos 60^\circ + \tan 45^\circ$
 $\cos 60^\circ + \tan 45^\circ$

$$= \frac{1}{2} + 1$$

$$= 1\frac{1}{2}$$

(c) $2 \sin 60^\circ - \tan 60^\circ$

$$= 2\left(\frac{\sqrt{3}}{2}\right) - \sqrt{3}$$

$$= \sqrt{3} - \sqrt{3}$$

$$= 0$$

(d) $3 \cos 30^\circ - \sin 60^\circ$
 $3 \cos 30^\circ - \sin 60^\circ$

$$= 3\left(\frac{\sqrt{3}}{2}\right) - \frac{\sqrt{3}}{2}$$

$$= 2\left(\frac{\sqrt{3}}{2}\right)$$

$$= \sqrt{3}$$

(e) $(2 \cos 30^\circ)(4 \tan 45^\circ) + \tan 60^\circ$
 $(2 \cos 30^\circ)(4 \tan 45^\circ) + \tan 60^\circ$

$$= 2\left(\frac{\sqrt{3}}{2}\right)(4)(1) + \sqrt{3}$$

$$= 4\sqrt{3} + \sqrt{3}$$

$$= 5\sqrt{3}$$

(f) $\frac{2 \cos 30^\circ}{\tan 30^\circ} - \cos 60^\circ / \frac{2 \cos 30^\circ}{\tan 30^\circ} - \cos 60^\circ$

$$= \frac{2\left(\frac{\sqrt{3}}{2}\right)}{\frac{1}{\sqrt{3}}} - \frac{1}{2}$$

$$= \sqrt{3} \times \sqrt{3} - \frac{1}{2}$$

$$= 3 - \frac{1}{2}$$

$$= 2\frac{1}{2}$$

(g) $(3 \sin 45^\circ)(4 \tan 30^\circ) - (2 \cos 30^\circ)(2 \sin 60^\circ)$
 $(3 \sin 45^\circ)(4 \tan 30^\circ) - (2 \cos 30^\circ)(2 \sin 60^\circ)$

$$= 3\left(\frac{1}{\sqrt{2}}\right)(4)\left(\frac{1}{\sqrt{3}}\right) - 2\left(\frac{\sqrt{3}}{2}\right)(2)\left(\frac{\sqrt{3}}{2}\right)$$

$$= \frac{12}{\sqrt{6}} - \frac{12}{4} \quad \leftarrow \frac{12}{\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}} = \frac{12\sqrt{6}}{6} = 2\sqrt{6}$$

$$= 2\sqrt{6} - 3$$

20. (a) 73.3°

$$= 73^\circ + 0.3^\circ$$

$$= 73^\circ + (0.3 \times 60)'$$

$$= 73^\circ + 18'$$

$$= 73^\circ 18'$$

(b) 42.6°

$$= 42^\circ + 0.6^\circ$$

$$= 42^\circ + (0.6 \times 60)'$$

$$= 42^\circ + 36'$$

$$= 42^\circ 36'$$

(c) 39.85°

$$= 39^\circ + 0.85^\circ$$

$$= 39^\circ + (0.85 \times 60)'$$

$$= 39^\circ + 51'$$

$$= 39^\circ 51'$$

21. (a) $46^\circ 9'$

$$= 46^\circ + 9'$$

$$= 46^\circ + \left(\frac{9}{60}\right)^\circ$$

$$= 46^\circ + 0.15^\circ$$

$$= 46.15^\circ$$

(b) $77^\circ 36'$

$$= 77^\circ + 36'$$

$$= 77^\circ + \left(\frac{36}{60}\right)^\circ$$

$$= 77^\circ + 0.6^\circ$$

$$= 77.6^\circ$$

$$\begin{aligned} \text{(c)} \quad & 15^\circ 12' \\ & = 15^\circ + 12' \\ & = 15^\circ + \left(\frac{12}{60}\right)^\circ \\ & = 15^\circ + 0.2^\circ \\ & = 15.2^\circ \end{aligned}$$

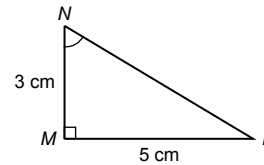
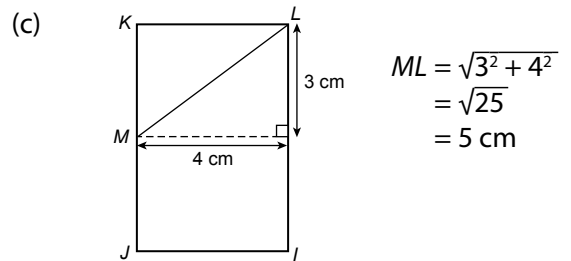
22. (a) $\cos 46.2^\circ / \cos 46.2^\circ = 0.6921$
 (b) $\tan 81^\circ 36' = 6.7720$
 (c) $\sin 36.7^\circ = 0.5976$
 (d) $\sin 52^\circ 24' = 0.7923$
 (e) $\cos 65.7^\circ / \cos 65.7^\circ = 0.4115$
 (f) $\tan 49^\circ 53' = 1.1868$
 (g) $\cos 77^\circ 43' / \cos 77^\circ 43' = 0.2127$
 (h) $\tan 24^\circ 7' = 0.4477$

23. (a) $\sin \theta = 0.69$
 $\theta = \sin^{-1}(0.69) = 43^\circ 38'$
 (b) $\cos \theta = 0.92$
 $\cos \theta = 0.92$
 $\theta = \cos^{-1}(0.92) = \cos^{-1}(0.92) = 23^\circ 4'$
 (c) $\sin \theta = 0.83$
 $\theta = \sin^{-1}(0.83) = 56^\circ 6'$
 (d) $\cos \theta = 0.17$
 $\cos \theta = 0.17$
 $\theta = \cos^{-1}(0.17) = \cos^{-1}(0.17) = 80^\circ 13'$
 (e) $\tan \theta = 3$
 $\theta = \tan^{-1}(3) = 71^\circ 34'$
 (f) $\tan \theta = 0.74$
 $\theta = \tan^{-1}(0.74) = 36^\circ 30'$
 (g) $\sin \theta = 0.45$
 $\theta = \sin^{-1}(0.45) = 26^\circ 45'$
 (h) $\cos \theta = 0.55$
 $\cos \theta = 0.55$
 $\theta = \cos^{-1}(0.55) = \cos^{-1}(0.55) = 56^\circ 38'$

24. (a) $\sin 45^\circ = \frac{PQ}{7}$
 $\frac{PQ}{7} = \frac{1}{\sqrt{2}}$
 $PQ = \frac{1}{\sqrt{2}} \times 7 = 4.95 \text{ m}$

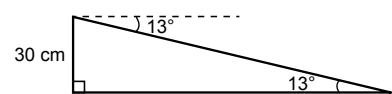
Lebar lebuh raya ialah 4.95 m.
 The width of the highway is 4.95 m.

(b) $\tan \theta = \frac{1.5}{2.6}$
 $\theta = \tan^{-1}(0.5769) = 30^\circ$

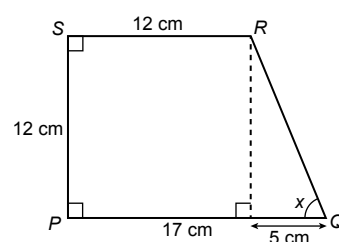


$$\begin{aligned} \tan \angle MNL &= \frac{5}{3} \\ \angle MNL &= \tan^{-1}\left(\frac{5}{3}\right) \\ &= 59.04^\circ \\ &= 59^\circ 2' \end{aligned}$$

(d) $\tan 13^\circ = \frac{25}{\text{Jarak/Distance}}$
 $\text{Jarak/Distance} = \frac{25}{\tan 13^\circ} = 108.3 \text{ cm}$



(e) (i) $\tan x = \frac{12}{5}$
 (ii) $QR = \sqrt{5^2 + 12^2} = 13 \text{ cm}$
 $\sin x = \frac{12}{13}$



Power PT3

Bahagian A

1. $\cos \theta - \sin \theta$
 $\cos \theta - \sin \theta$
 $= \frac{15}{17} - \frac{8}{17}$

Jawapan/ Answer: **A**

2. **A** $\frac{QR}{PQ} = \frac{1.5}{2} = \frac{3}{4}$

B $\frac{QR}{PQ} = \frac{3}{4}$

C $\frac{QR}{PQ} = \frac{6}{5} \neq \frac{3}{4}$

D $\frac{QR}{PQ} = \frac{6}{8} = \frac{3}{4}$

Jawapan/ Answer: **C**

3. $\frac{5}{13} = \frac{10}{PR}$
 $PR = 26$

Jawapan/ Answer: **D**

4. $\cos \angle PRQ = \frac{21}{29} = 0.7241$ ($\cos \angle PRQ = \frac{21}{29} = 0.7241$)

$\sin \angle PRQ = \frac{20}{29} = 0.6897$

$\sin \angle QPR = \frac{21}{29} = 0.7241$

$\tan \angle QPR = \frac{21}{20} = 1.05$

Jawapan/ Answer: **D**

Bahagian B

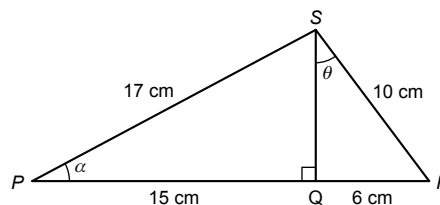
5. (a)

| | Nisbah trigonometri Trigonometric ratios | Nilai θ Value of θ |
|-------|--|-------------------------------------|
| (i) | $\sin \theta = 0.1773$ | $10^\circ 13'$ |
| (ii) | $\cos \theta = 0.4216$ $\cos \theta = 0.4216$ | $65^\circ 4'$ |
| (iii) | $\tan \theta = 0.7852$ | $38^\circ 8'$ |

(b) PQR ialah segi tiga sama sisi, maka $\theta = 60^\circ$.
PQR is an equilateral triangle, hence $\theta = 60^\circ$.
 $\cos \theta = \cos 60^\circ$
 $\cos \theta = \cos 60^\circ$
 $= 0.5$

6. (a) $\theta = \tan^{-1} \frac{18}{27}$
 $= 33.69^\circ / 33^\circ 41'$

(b)



Bahagian C

7. (a) $\cos \angle PRQ = \frac{12}{PR}$
 $\frac{4}{5} = \frac{12}{PR}$
 $PR = 15 \text{ cm}$

$RS = \sqrt{8^2 + 15^2}$
 $= 17 \text{ cm}$

$\sin \theta = \frac{15}{17}$

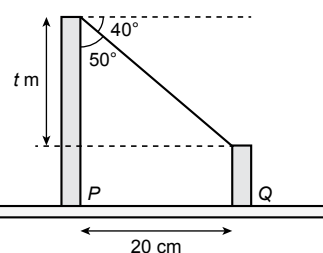
(b) $\tan \angle TPQ = \frac{21}{20}$

$\frac{63}{20 + QR} = \frac{21}{20}$

$\frac{3}{20 + QR} = \frac{1}{20}$

$60 = 20 + QR$
 $QR = 40 \text{ cm}$

(c)



$\tan 50^\circ = \frac{20}{t}$
 $t = \frac{20}{\tan 50^\circ}$
 $= 16.78 \text{ m}$

Tinggi bangunan Q / Height of building Q
 $= 24.5 - 16.78$
 $= 7.72 \text{ m}$

8. (a) (i) $\frac{12}{13} = \frac{12}{PR}$
 $PR = 13 \text{ cm}$
 $QR = \sqrt{13^2 - 12^2}$
 $= 5 \text{ cm}$
- (ii) $\tan \angle PSQ = \frac{12}{2 \times 5}$
 $= \frac{6}{5}$
- (b) $\theta = \angle SPQ - \angle RPQ$
 $= \tan^{-1} \frac{12}{18} - \tan^{-1} \frac{6}{18}$
 $= 33^\circ 41' - 18^\circ 26'$
 $= 15^\circ 15'$
- (c) $PR = \sqrt{25^2 - 7^2}$
 $= 24 \text{ cm}$
 $TR = \frac{2}{3} \times 24$
 $= 16 \text{ cm}$
 $\tan \theta = \frac{7}{16}$

Power KBAT

1. $\sin x = \frac{\boxed{CD}}{\boxed{AC}}$
- $\frac{\boxed{BD}}{\cos y} = \frac{\boxed{AB}}{\cos y}$
- $\tan z = \frac{\boxed{BD}}{\boxed{CD}}$

2. $\cos \angle QPS = \frac{5}{13} = \frac{5 \times 2}{13 \times 2} = \frac{10}{26} = \frac{\text{sisi bersebelahan}}{\text{hipotenus}}$
 $\cos \angle QPS = \frac{5}{13} = \frac{5 \times 2}{13 \times 2} = \frac{10}{26} = \frac{\text{adjacent side}}{\text{hypotenuse}}$

Maka/ Hence, $\angle PSQ = 90^\circ$

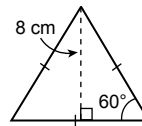
dan/ and $\angle SQR = 90^\circ$ ← sudut selang-seli
 alternate angles

$QS = \sqrt{26^2 - 10^2}$
 $= \sqrt{576}$
 $= 24 \text{ cm}$

$\tan \angle QSR = \frac{32}{24}$
 $\angle QSR = \tan^{-1} \left(\frac{32}{24} \right)$
 $= 53^\circ 8'$

$\angle PSR = 90^\circ + 53^\circ 8'$
 $= 143^\circ 8'$

3.



$\sin 60^\circ = \frac{8}{\text{Panjang sisi/ Length of side}}$

$\text{Panjang sisi} = \frac{8}{\sin 60^\circ}$
 $\text{Length of side} = 9.24 \text{ cm}$

$\text{Perimeter} = 3 \times 9.24$
 $= 27.72 \text{ cm}$

JAWAPAN

BAB
6

Sudut dan Tangen bagi Bulatan *Angles and Tangents of Circles*

1.

| | Sudut pada pusat yang dicangkum oleh <i>Angle at the centre subtended by</i> | Sudut pada lilitan yang dicangkum oleh <i>Angle at the circumference subtended by</i> |
|-----|---|--|
| (a) | lengkuk minor PQ <i>minor arc PQ</i> a | lengkuk minor PQ <i>minor arc PQ</i> b |
| (b) | lengkuk minor PQ <i>minor arc PQ</i> x | lengkuk minor PQ <i>minor arc PQ</i> y |
| (c) | lengkuk major PQ <i>major arc PQ</i> c | lengkuk major PQ <i>major arc PQ</i> d |
| (d) | lengkuk minor PQ <i>minor arc PQ</i> n | lengkuk minor PQ <i>minor arc PQ</i> m |

2. (a) $x = 50^\circ$
 $y = 50^\circ$
(b) $x = 25^\circ$
 $y = 25^\circ$
(c) $x = 30^\circ$
 $y = 30^\circ$
(d) $x = 20^\circ$
 $y = 20^\circ$

Sudut-sudut pada lilitan yang dicangkum oleh lengkuk yang sama atau sama panjang adalah sama ($x = y$).

The angles at the circumference subtended by the same arc or the arcs of the same length are equal ($x = y$).

3. Saiz sudut pada lilitan yang dicangkum oleh suatu lengkuk adalah berkadaran dengan panjang lengkuk tersebut.

The size of the angle at the circumference subtended by an arc is proportional to the length of the arc.

4. (a) $p = q$
 $r = s$
(b) $a = b = c$
 $d = e$
(c) $x = y$
(d) $j = k$
5. (a) $x = \angle CAD = 40^\circ$
(b) $x = \angle CAD = 55^\circ$
(c) $x = \angle CAD = 32^\circ$
(d) $x = \angle CBD = 30^\circ$
6. (a) $x = 45^\circ$
(b) $x = 25^\circ$
(c) $x = 35^\circ$
(d) $\frac{x}{54^\circ} = \frac{5}{15}$
 $x = 18^\circ$
(e) $\frac{x}{33^\circ} = \frac{8}{4}$
 $x = 66^\circ$
(f) $\frac{x}{24^\circ} = \frac{14}{7}$
 $x = 48^\circ$
7. (a) $x = 20^\circ$
 $y = 40^\circ$
(b) $x = 90^\circ$
 $y = 180^\circ$
(c) $x = 100^\circ$
 $y = 200^\circ$
(d) $x = 70^\circ$
 $y = 140^\circ$

Sudut pada pusat adalah dua kali sudut pada lilitan yang dicangkum oleh lengkuk yang sama ($y = 2x$).

The angle at the centre is twice the angle at the circumference subtended by the same arc ($y = 2x$).

90°

8. (a) Sudut pada pusat bulatan yang dicangkum oleh lengkok yang sama panjang adalah sama.

The angles at the centre subtended by the arcs of the same length are equal.

- (b) Saiz sudut pada pusat bulatan yang dicangkum oleh suatu lengkok adalah berkadaran dengan panjang lengkok tersebut.

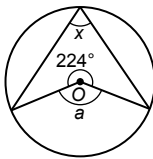
The size of the angle at the centre subtended by an arc is proportional to the length of the arc.

9. (a) $y = 2x$
 (b) $y = 2x$
 (c) $x = 2y$
 (d) $x = 2y$

10. (a) $x = 90^\circ$
 (b) $x = 2 \times 30^\circ = 60^\circ$
 (c) $2x = 80^\circ$
 $x = \frac{80^\circ}{2} = 40^\circ$
 (d) $2x = 210^\circ$
 $x = \frac{210^\circ}{2} = 105^\circ$
 (e) $2x = 120^\circ$
 $x = \frac{120^\circ}{2} = 60^\circ$
 (f) $\angle PQR = 90^\circ$
 $x = 180^\circ - 90^\circ - 40^\circ = 50^\circ$

11. (a) $\frac{x}{195^\circ} = \frac{7}{21}$
 $x = 65^\circ$
 (b) $x = 36^\circ$
 (c) $\frac{x}{43^\circ} = \frac{8}{4}$
 $x = 86^\circ$

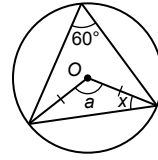
12. (a)



$$a = 360^\circ - 224^\circ = 136^\circ$$

$$x = \frac{136^\circ}{2} = 68^\circ$$

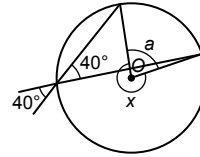
- (b)



$$a = 2 \times 60^\circ = 120^\circ$$

$$x = \frac{180^\circ - 120^\circ}{2} = \frac{60^\circ}{2} = 30^\circ$$

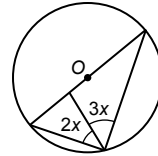
- (c)



$$a = 2 \times 40^\circ = 80^\circ$$

$$x = 360^\circ - 80^\circ = 280^\circ$$

- (d)

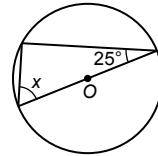


$$2x + 3x = 90^\circ$$

$$5x = 90^\circ$$

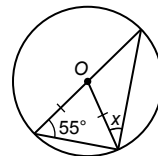
$$x = \frac{90^\circ}{5} = 18^\circ$$

- (e)



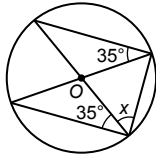
$$x = 180^\circ - 90^\circ - 25^\circ = 65^\circ$$

- (f)



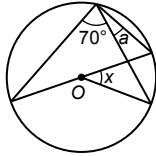
$$x = 90^\circ - 55^\circ = 35^\circ$$

(g)



$$x = 90^\circ - 35^\circ = 55^\circ$$

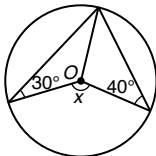
(h)



$$a = 90^\circ - 70^\circ = 20^\circ$$

$$x = 2 \times 20^\circ = 40^\circ$$

(i)



$$x = 2 \times (30^\circ + 40^\circ) = 2 \times 70^\circ = 140^\circ$$

13. (a) $\angle PQS = \angle PRS = 55^\circ$

$$\angle PQS = \angle PRS = 55^\circ$$

$$\angle OQP = \angle OPQ = 30^\circ$$

$\triangle OPQ$ ialah segi tiga sama kaki.
 $\triangle OPQ$ is an isosceles triangle.

$$\begin{aligned} \angle SQT &= \angle PQS - \angle OQP \\ &= 55^\circ - 30^\circ \\ &= 25^\circ \end{aligned}$$

$$x = 180^\circ - 90^\circ - 25^\circ = 65^\circ$$

$\triangle QST$ ialah segi tiga bersudut tegak.
 $\triangle QST$ is a right-angled triangle.

(b) $\angle ABD = \angle BAC = 32^\circ$

$$\angle ODB = \angle OBD = 32^\circ$$

$\triangle OBD$ ialah segi tiga sama kaki.
 $\triangle OBD$ is an isosceles triangle.

$$x = 90^\circ - 32^\circ = 58^\circ$$

$$y = 32^\circ$$

$\triangle OAC$ ialah segi tiga sama kaki.
 $\triangle OAC$ is an isosceles triangle.

$$x + y = 58^\circ + 32^\circ = 90^\circ$$

$$\begin{aligned} \angle OHG &= \frac{180^\circ - 102^\circ}{2} \\ &= \frac{78^\circ}{2} \\ &= 39^\circ \end{aligned}$$

$\triangle OGH$ ialah segi tiga sama kaki.
 $\triangle OGH$ is an isosceles triangle.

$$2x + x + 39^\circ = 90^\circ$$

$\angle EHG = 90^\circ$

$$3x = 90^\circ - 39^\circ$$

$$3x = 51^\circ$$

$$x = \frac{51^\circ}{3} = 17^\circ$$

$$x = 2 \times 35^\circ = 70^\circ$$

Lengkuk $PQ =$ lengkuk RS
 $Arc PQ = arc RS$

$$y = \frac{180^\circ - 70^\circ}{2}$$

$\triangle ORS$ ialah segi tiga sama kaki.
 $\triangle ORS$ is an isosceles triangle.

$$= 55^\circ$$

(e) $\angle OQR = 35^\circ$

$$\begin{aligned} \angle QOR &= 180^\circ - 35^\circ - 35^\circ \\ &= 110^\circ \end{aligned}$$

$$\begin{aligned} \angle QPR &= \frac{110^\circ}{2} \\ &= 55^\circ \end{aligned}$$

$$x = 180^\circ - 35^\circ - 35^\circ - 30^\circ - 55^\circ = 25^\circ$$



Kaedah Alternatif . . .

$$\begin{aligned} \angle OQR &= 35^\circ \\ \angle PQR &= 30^\circ + 35^\circ \\ &= 65^\circ \\ \angle PQR &= 2 \times 65^\circ \\ &= 130^\circ \\ x &= \frac{180^\circ - 130^\circ}{2} \\ &= 25^\circ \end{aligned}$$

(f) (i) $\angle LNM = \angle KNL$

$$= 28^\circ$$

$$\begin{aligned} \angle KNM &= 28^\circ + 28^\circ \\ &= 56^\circ \end{aligned}$$

$$x = 180^\circ - 90^\circ - 56^\circ = 34^\circ$$

(ii) $KN = 2 \times 6.5$

$$= 13 \text{ cm}$$

$$\sin x = \frac{MN}{KN}$$

$\triangle KMN$ ialah segi tiga bersudut tegak.
 $\triangle KMN$ is a right-angled triangle.

$$\sin 34^\circ = \frac{MN}{13}$$

$$MN = 13 \times \sin 34^\circ$$

$$MN = 7.27 \text{ cm}$$

(g) (i) $\angle PTR$
 $= 180^\circ - 62^\circ - 20^\circ$
 $= 98^\circ$

(ii) $\angle RQS$
 $= \angle RTS$
 $= 180^\circ - 98^\circ$
 $= 82^\circ$

(iii) $\angle RUS$
 $= \angle QUT$
 $= 360^\circ - 62^\circ - 98^\circ - 98^\circ$
 $= 102^\circ$

(h) $\angle AOD = 60^\circ$ ← ΔAOD ialah segi tiga sama sisi.
 ΔAOD is an equilateral triangle.

$$x = \frac{60^\circ}{2}$$

$$= 30^\circ$$

14. (a) Sisi empat $ABCD$ itu dikenali sebagai sisi empat kitaran .

The quadrilateral $ABCD$ is known as cyclic quadrilateral .

(b) Keempat-empat bucu sebuah sisi empat kitaran menyentuh lilitan sebuah bulatan.

The four vertices of a cyclic quadrilateral touch the circumference of a circle.

(c) Berdasarkan rajah di atas, $\angle A$ dan $\angle C$ serta $\angle B$ dan $\angle D$ dikenali sebagai sudut bertentangan .

Based on the above diagram, $\angle A$ and $\angle C$ as well as $\angle B$ and $\angle D$ are known as opposite angles .

15. (a) (i) Bukan sisi empat kitaran. Bucu R tidak terletak pada lilitan.

Not a cyclic quadrilateral. Vertex R does not lie on the circumference.

(b) (i) Bukan sisi empat kitaran. Bucu O tidak terletak pada lilitan.

Not a cyclic quadrilateral. Vertex O does not lie on the circumference.

(c) (i) Sisi empat kitaran. Semua bucu terletak pada lilitan.

A cyclic quadrilateral. All vertices lie on the circumference.

(ii) $\angle P$ dan/ and $\angle R$,
 $\angle Q$ dan/ and $\angle S$

(d) (i) Sisi empat kitaran. Semua bucu terletak pada lilitan.

A cyclic quadrilateral. All vertices lie on the circumference.

(ii) $\angle P$ dan/ and $\angle R$,
 $\angle Q$ dan/ and $\angle S$

(e) (i) Bukan sisi empat kitaran. Bucu O tidak terletak pada lilitan.

Not a cyclic quadrilateral. Vertex O does not lie on the circumference.

(f) (i) Sisi empat kitaran. Semua bucu terletak pada lilitan.

A cyclic quadrilateral. All vertices lie on the circumference.

(ii) $\angle P$ dan/ and $\angle R$,
 $\angle Q$ dan/ and $\angle S$

16. (a)

| Sudut peluaran Exterior angle | Sudut pedalaman bertentangan yang sepadan Corresponding interior opposite angle |
|----------------------------------|--|
| r | t |
| u | q |

(b)

| Sudut peluaran Exterior angle | Sudut pedalaman bertentangan yang sepadan Corresponding interior opposite angle |
|----------------------------------|--|
| a | e |
| d | b |

17.

| | | |
|----------------|-----------------|-----------------|
| $a = 60^\circ$ | $b = 100^\circ$ | $c = 120^\circ$ |
| $d = 80^\circ$ | $e = 100^\circ$ | $f = 120^\circ$ |

(a) $a + c = 180^\circ, b + d = 180^\circ$

(b) Hasil tambah sudut-sudut pedalaman yang bertentangan dalam sebuah sisi empat kitaran ialah 180° .

The sum of the interior opposite angles in a cyclic quadrilateral is 180° .

(c) Sudut peluaran sebuah sisi empat kitaran bersamaan dengan sudut pedalaman bertentangan yang sepadan.

The exterior angle of a cyclic quadrilateral is equal to its corresponding interior opposite angle.

18. (a)

$$a + c = 180^\circ$$

$$b + d = 180^\circ$$

$$a + b + c + d = 360^\circ$$

(b) $p + r = 180^\circ$

$$q + s = 180^\circ$$

$$p + q + r + s = 360^\circ$$

(c) $x = y$

19. (a) $m = 180^\circ - 105^\circ$
 $= 75^\circ$
 $n = 180^\circ - 95^\circ$
 $= 85^\circ$
- (b) $m = 112^\circ$
 $n = 97^\circ$
- (c) $m = 180^\circ - 85^\circ$
 $= 95^\circ$
 $n = 80^\circ$
- (d) $m = 180^\circ - 72^\circ$
 $= 108^\circ$
 $n = 180^\circ - 47^\circ$
 $= 133^\circ$
- (e) $m = 180^\circ - 110^\circ$
 $= 70^\circ$
 $n = 180^\circ - 26^\circ - 80^\circ$
 $= 74^\circ$
- (f) $m = 180^\circ - 68^\circ$
 $= 112^\circ$
 $n = m = 112^\circ$
- (g) $m = 180^\circ - 82^\circ$
 $= 98^\circ$
 $n = 180^\circ - 59^\circ - 100^\circ$
 $= 21^\circ$
- (h) $a = 180^\circ - 120^\circ$
 $= 60^\circ$
 $m = 180^\circ - 51^\circ - 60^\circ$
 $= 69^\circ$
 $n = 51^\circ + 60^\circ$
 $= 111^\circ$

20. (a) $2x = 180^\circ - 92^\circ$
 $2x = 88^\circ$
 $x = \frac{88^\circ}{2}$
 $= 44^\circ$
- $4y + 2y = 180^\circ$
 $6y = 180^\circ$
 $y = \frac{180^\circ}{6}$
 $= 30^\circ$
- (b) $a = 180^\circ - 85^\circ$
 $= 95^\circ$
- $x = 180^\circ - 50^\circ - 95^\circ$
 $= 35^\circ$
- $y = 180^\circ - 88^\circ$
 $= 92^\circ$

(c) $x = \frac{180^\circ - 70^\circ}{2}$
 $= \frac{110^\circ}{2}$
 $= 55^\circ$

$y = 180^\circ - 55^\circ$
 $= 125^\circ$

21. (a) $\angle OPQ = \frac{180^\circ - 66^\circ}{2}$ ← ΔOPQ ialah segi tiga sama kaki.
 ΔOPQ is an isosceles triangle.
 $= \frac{114^\circ}{2}$
 $= 57^\circ$

$x = 180^\circ - 20^\circ - 57^\circ$
 $= 103^\circ$

(b) $\angle ACB = \angle ABC = \angle BCD = 38^\circ$
 $p = \angle CAB$
 $= 180^\circ - 38^\circ - 38^\circ$
 $= 104$

(c) $\angle GHJ = \angle GKL = 100^\circ$
 $\angle HGJ = \frac{180^\circ - 100^\circ}{2}$
 $= \frac{80^\circ}{2}$
 $= 40^\circ$

$x = 180^\circ - 40^\circ - 62^\circ$ ← Hasil tambah sudut pedalaman bertentangan ialah 180° .
 $= 78^\circ$
Sum of interior opposite angles is 180° .

(d) $\angle OBC = \angle OCB = 35^\circ$
 $\angle OBA = \angle OAB = 30^\circ$
 $\angle ABC = 35^\circ + 30^\circ$
 $= 65^\circ$

$x = 180^\circ - 65^\circ$ ← Hasil tambah sudut pedalaman bertentangan ialah 180° .
 $= 115^\circ$
Sum of interior opposite angles is 180° .

22. (a) Garis TVS ialah tangen kepada bulatan pada titik V .
Line TVS is a tangent to the circle at point V .
 Garis SWU ialah tangen kepada bulatan pada titik W .
Line SWU is a tangent to the circle at point W .
- (b) Garis ABC ialah tangen kepada bulatan pada titik B .
Line ABC is a tangent to the circle at point B .
 Garis CDF ialah tangen kepada bulatan pada titik D .
Line CDF is a tangent to the circle at point D .

23. (i) (a) (i) $M: \underline{90^\circ}$
 (ii) $Q: \underline{90^\circ}$
 (iii) $T: \underline{90^\circ}$
- (b) Tangen kepada bulatan adalah berserenjang dengan jejari bulatan.
The tangent to the circle is perpendicular to the radius of the circle.
- (ii) (a) (i) Panjang AB / Length of AB: 2.35 cm
 (ii) Panjang AC / Length of AC: 2.35 cm
 (iii) $\angle OAB: \underline{23^\circ}$
 (iv) $\angle OAC: \underline{23^\circ}$
 (v) $\angle AOB: \underline{67^\circ}$
 (vi) $\angle AOC: \underline{67^\circ}$
- (b) (i) $\angle BAC = 23^\circ + 23^\circ = 46^\circ$
 (ii) $\angle BOC = 67^\circ + 67^\circ = 134^\circ$
 (iii) $\angle BAC + \angle BOC = 46^\circ + 134^\circ = 180^\circ$
- (c) (i) Panjang AB adalah sentiasa sama dengan panjang AC.
The length of AB is always the same as the length of AC.
- (ii) Garis OA ialah pembahagi dua sama sudut bagi $\angle BAC$ dan $\angle BOC$.
The line OA is the angle bisector of $\angle BAC$ and $\angle BOC$.
- (iii) $\angle BAC$ dan $\angle BOC$ ialah sudut penggenap.
 $\angle BAC$ and $\angle BOC$ are supplementary angles.
- (iv) Saiz dan bentuk bagi $\triangle OAB$ dan $\triangle OAC$ adalah sama. Maka, $\triangle OAB$ dan $\triangle OAC$ adalah kongruen.
The size and shape of the $\triangle OAB$ and $\triangle OAC$ are the same. Hence, $\triangle OAB$ and $\triangle OAC$ are congruent.
- (iii) (a) (i) $\angle MAC: \underline{70^\circ}$
 (ii) $\angle NAB: \underline{50^\circ}$
 (iii) $\angle ABC: \underline{70^\circ}$
 (iv) $\angle ACB: \underline{50^\circ}$

- (b) Sudut di antara tangen dengan perentas adalah sama dengan sudut dalam tembereng selang-seli yang dicangkum oleh perentas itu.

The angle between the tangent and the chord is the same as the angle in the alternate segment which is subtended by the chord.

24. (a) $x = 90^\circ$
 (b) $x + y = 180^\circ$
 (c) $p = r$
 $q = s$
25. (a) $\angle AOB = 180^\circ - 130^\circ = 50^\circ$
 $x = 180^\circ - 90^\circ - 50^\circ = 40^\circ$
- (b) $AB = BC$
 $\angle OBA = \angle OBC = 90^\circ$
 $\angle OCB = \angle OAB = 35^\circ$
 $x = 180^\circ - 35^\circ - 35^\circ = 110^\circ$
26. (a) $x = 360^\circ - 67^\circ - 67^\circ = 226^\circ$
- (b) $\angle POR = 360^\circ - 248^\circ = 112^\circ$
 $\angle QOR = 112^\circ \div 2 = 56^\circ$
 $x = 180^\circ - 90^\circ - 56^\circ = 34^\circ$
- (c) $\angle POR = 180^\circ - 70^\circ = 110^\circ$
 $\angle QOR = 110^\circ \div 2 = 55^\circ$
 $x = \frac{180^\circ - 55^\circ}{2} = \frac{125^\circ}{2} = 62.5^\circ$
- (d) $\angle PQR = 42^\circ + 42^\circ = 84^\circ$
 $\angle POR = 180^\circ - 84^\circ = 96^\circ$
 $x = 360^\circ - 96^\circ = 264^\circ$
- (e) $\angle POR = 360^\circ - 225^\circ = 135^\circ$
 $x = 180^\circ - 135^\circ = 45^\circ$

27. (a) $BC = CD$
Maka / Hence,
 $m = 1.3$
- (b) $OD = OB = 3 \text{ cm}$
 $\angle ODC = 90^\circ$
 $m = \sqrt{3^2 + 4^2}$
 $= \sqrt{9 + 16}$
 $= \sqrt{25}$
 $= 5$
- (c) $CD = CB = 12 \text{ cm}$
 $\angle ODC = 90^\circ$
 $m = \sqrt{13^2 - 12^2}$
 $= \sqrt{169 - 144}$
 $= \sqrt{25}$
 $= 5$

28. (a) $x = 90^\circ$
 $y = 70^\circ$
- (b) $x = 55^\circ$
 $y = 180^\circ - 55^\circ - 38^\circ - 40^\circ$
 $= 47^\circ$
- (c) $x = 90^\circ - 32^\circ$
 $= 58^\circ$
 $y = 32^\circ$
- (d) $x = 90^\circ - 28^\circ$
 $= 62^\circ$
 $y = 90^\circ - 25^\circ$
 $= 65^\circ$
- (e) $x = \angle QSR = \angle SQR$
 $= 60^\circ$
 $y = \angle USQ$
 $= 180^\circ - 70^\circ - 60^\circ$
 $= 50^\circ$

29. (a) $x = 64^\circ$
 $y = \frac{180^\circ - 64^\circ}{2}$
 $= \frac{116^\circ}{2}$
 $= 58^\circ$
 $z = y = 58^\circ$
 $x + y + z = 64^\circ + 58^\circ + 58^\circ$
 $= 180^\circ$
- (b) $GJ = GK$, maka $\triangle JGK$ ialah segi tiga sama kaki
 $GJ = GK$, hence $\triangle JGK$ is an isosceles triangle.
 $\angle GJK = 75^\circ$
 $x = 180^\circ - 75^\circ - 75^\circ$
 $= 30^\circ$
 $y = 180^\circ - 68^\circ - 75^\circ$
 $= 37^\circ$


- (c) (i) $x = 180^\circ - 80^\circ = 100^\circ$
(ii) $AF = AE - FE$ $AC = AB + BC$
 $= 34 - 22$ $= 12 + 22$
 $= 12 \text{ cm}$ $= 34 \text{ cm}$

- (d) $\angle TQR = 85^\circ$
 $x = 85^\circ - 65^\circ$
 $= 20^\circ$
- (e) (i) $\angle QAV = 50^\circ + 50^\circ$
 $= 100^\circ$
 $\angle QRV = 180^\circ - 100^\circ$
 $= 80^\circ$
 $m = 180^\circ - 80^\circ$
 $= 100^\circ$

- (ii) $\sin \angle QAR = \frac{QR}{AR}$
 $\sin 50^\circ = \frac{12}{AR}$
 $AR = 15.7 \text{ cm}$
 $\angle WRB = 80^\circ \div 2$
 $= 40^\circ$
 $\cos \angle WRB = \frac{RW}{RB}$
 $\cos 40^\circ = \frac{17}{RB}$
 $RB = 22.2 \text{ cm}$
 $AB = AR + RB$
 $= 15.7 + 22.2$
 $= 37.9 \text{ cm}$

30. (a) $x = 42^\circ$
 $\angle URS = 180^\circ - 78^\circ$
 $= 102^\circ$
 $y = 180^\circ - 42^\circ - 102^\circ$
 $= 36^\circ$

- (b) $x = \frac{84^\circ}{2}$
 $= 42^\circ$
 $\angle ABE = \angle EFG$
 $= 110^\circ$
 $\angle FBE = \frac{108^\circ}{2}$
 $= 54^\circ$
 $y = 110^\circ - 54^\circ$
 $= 56^\circ$
 $y - x = 56^\circ - 42^\circ$
 $= 14^\circ$

 >> Kaedah Alternatif ...

$$\angle PFE = \frac{180^\circ - 108^\circ}{2} = 36^\circ$$

$$y + \angle BAF = \angle BFG$$

$$y + 90^\circ = 110^\circ + 36^\circ$$

$$y = 146^\circ - 90^\circ = 56^\circ$$

$$\begin{aligned}
 \text{(c) } \angle STQ &= \angle SQR \\
 &= 50^\circ \\
 \angle OTS &= 50^\circ - 35^\circ \\
 &= 15^\circ \\
 \angle TOS &= 180^\circ - 15^\circ - 15^\circ \\
 &= 150^\circ \\
 \angle TQS &= \frac{150^\circ}{2} \\
 &= 75^\circ \\
 x &= 180^\circ - 50^\circ - 75^\circ \\
 &= 55^\circ \\
 \angle TSQ &= x \\
 &= 55^\circ \\
 \angle OST &= \angle OTS \\
 &= 15^\circ \\
 y &= 55^\circ - 15^\circ \\
 &= 40^\circ \\
 x + y &= 55^\circ + 40^\circ \\
 &= 95^\circ
 \end{aligned}$$



Kaedah Alternatif ...

$$\begin{aligned}
 \angle OQT &= \angle OTQ = 35^\circ \\
 \angle OQS &= y \\
 \text{Maka/ Hence} \\
 x + 35^\circ + y + 50^\circ &= 180^\circ \\
 x + y &= 180^\circ - 35^\circ - 50^\circ \\
 &= 95^\circ
 \end{aligned}$$

$$\begin{aligned}
 \text{(d) } \angle MLQ &= \angle LPQ \\
 &= 180^\circ - 120^\circ \\
 &= 60^\circ \\
 2x &= 180^\circ - 74^\circ - 60^\circ \\
 2x &= 46^\circ \\
 x &= \frac{46^\circ}{2} \\
 &= 23^\circ
 \end{aligned}$$

Power PT3

Bahagian A

- $x = 110^\circ$
 $y = 180^\circ - 80^\circ = 100^\circ$
 $x + y = 110^\circ + 100^\circ = 210^\circ$
 Jawapan/ Answer: **C**
- p dan s ialah sudut pada suatu lilitan bulatan yang dicangkum oleh lengkok yang sama.
p and s are the angles at the circumference subtended by the same arc.
 Jawapan/ Answer: **C**

$$3. x = \frac{54^\circ + 42^\circ}{2} = 48^\circ$$

Jawapan/ Answer: **B**

$$\begin{aligned}
 4. x &= 50^\circ, y = 55^\circ \\
 y - x &= 55^\circ - 50^\circ \\
 &= 5^\circ
 \end{aligned}$$

Jawapan/ Answer: **A**

$$\begin{aligned}
 5. \text{ Sudut refleks } POR / \text{ Reflex angle } POR \\
 &= 360^\circ - 160^\circ \\
 &= 200^\circ
 \end{aligned}$$

$$\begin{aligned}
 \angle PQR &= 200^\circ \div 2 \\
 &= 100^\circ
 \end{aligned}$$

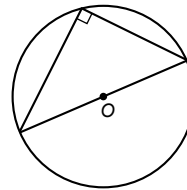
$$\begin{aligned}
 x &= 360^\circ - 160^\circ - 35^\circ - 100^\circ \\
 &= 65^\circ
 \end{aligned}$$

Jawapan/ Answer: **D**

Bahagian B

- -

(b)



$$7. \text{ (a)}$$

| | |
|-----------------------------|-------------------------------------|
| $x = 180^\circ + 80^\circ$ | |
| $x = 180^\circ - 80^\circ$ | <input checked="" type="checkbox"/> |
| $x = 180^\circ - 100^\circ$ | |

- $x = 35^\circ$
- $x = 6$
- $x = 50^\circ$

Bahagian C

- Tangen / Tangent
 - $\angle a$
 - $\angle c$
- $\angle POR = 180^\circ - 48^\circ - 48^\circ = 84^\circ$
 $x = \frac{84^\circ}{2} = 42^\circ$

$$\begin{aligned} \text{(ii) } \angle QOR &= 2 \times 50^\circ \\ &= 100^\circ \\ x &= 180^\circ - 100^\circ \\ &= 80^\circ \end{aligned}$$

$$\begin{aligned} \text{(c) Sudut refleks / Reflex angle QOS} \\ &= 2 \times 115^\circ \\ &= 230^\circ \end{aligned}$$

$$\begin{aligned} \text{Sudut cakah / Obtuse angle QOS} \\ &= 360^\circ - 230^\circ \\ &= 130^\circ \\ x &= 360^\circ - 90^\circ - 90^\circ - 130^\circ \\ &= 50^\circ \end{aligned}$$

$$\begin{aligned} \text{9. (a) } x + y &= 165^\circ \\ x + 2x &= 165^\circ \\ 3x &= 165^\circ \\ x &= 55^\circ \\ y &= 2x \\ &= 2 \times 55^\circ \\ &= 110^\circ \end{aligned}$$

$$\begin{aligned} \text{(b) (i) } \angle QPR = \angle QRP &= 47^\circ \\ x &= 180^\circ - \angle QPR - \angle QRP - \angle SPR \\ &= 180^\circ - 3 \times 47^\circ \\ &= 39^\circ \end{aligned}$$

$$\begin{aligned} \text{(ii) } y &= \angle PQR \\ &= 180^\circ - 2 \times 47^\circ \\ &= 86^\circ \end{aligned}$$

$$\begin{aligned} \text{(c) } \tan \angle VSN &= \frac{12}{33} \\ \angle VSN &= 19.98^\circ \\ x &= \angle VNS \\ &= 180^\circ - 90^\circ - 19.98^\circ \\ &= 70.02^\circ \end{aligned}$$

Power KBAT

$$\begin{aligned} \text{1. (a) } \cos \angle APO &= \frac{AP}{OP} & \left[\cos \angle APO = \frac{AP}{OP} \right] \\ &= \frac{2.5}{12.5} \end{aligned}$$

$$\begin{aligned} \angle APO &= \cos^{-1} 0.2 & [\angle APO = \cos^{-1} 0.2] \\ &= 78^\circ 28' \end{aligned}$$

$$\text{Maka/ Hence, } \angle APB = 78^\circ 28' \times 2 = 156^\circ 56'$$

$$\begin{aligned} \text{(b) } \angle DOC &= 180^\circ - \angle APB \\ &= 180^\circ - 156^\circ 56' \\ &= 23^\circ 4' \end{aligned}$$

$$\begin{aligned} \text{Luas sektor minor COD / Area of minor sector COD} \\ &= \frac{23^\circ 4'}{360^\circ} \times 3.142 \times 3^2 \\ &= 1.81 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{(c) Luas sektor minor APB / Area of minor sector APB} \\ &= \frac{156^\circ 56'}{360^\circ} \times 3.142 \times 2.5^2 \\ &= 8.56 \text{ cm}^2 \\ OA &= \sqrt{OP^2 - AP^2} \\ &= \sqrt{12.5^2 - 2.5^2} \\ &= 12.25 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Luas OAPB / Area of OAPB} &= 2 \times \frac{1}{2} \times 12.25 \times 2.5 \\ &= 30.63 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Luas kawasan berlorek / Area of shaded region} \\ &= 30.63 - 1.81 - 8.56 \\ &= 20.26 \text{ cm}^2 \end{aligned}$$

JAWAPAN

BAB 7

Pelan dan Dongakan
Plans and Elevations

1. (a) $ABCD$: FA, GB, HC, ED
 (b) $ADEF$: BA, CD, HE, GF
 (c) $ABGF$: DA, CB, HG, EF

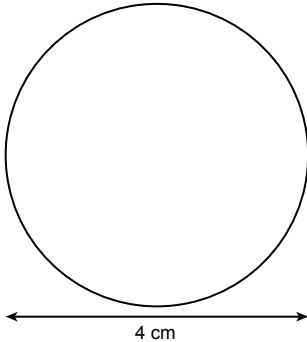
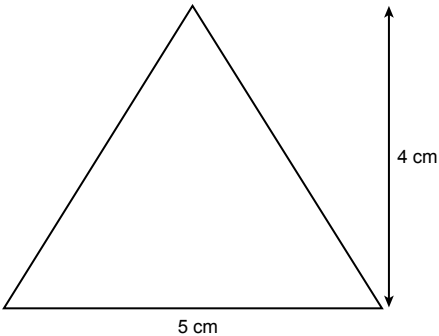

2. (a)

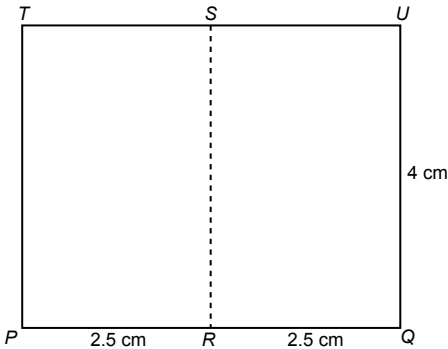
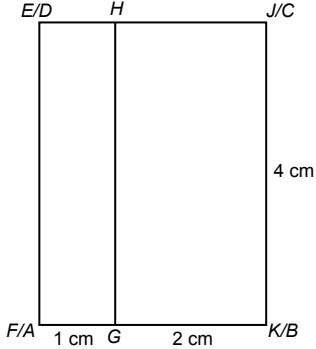
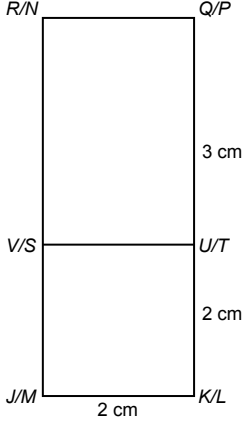
(b)

(c)

3. **D**

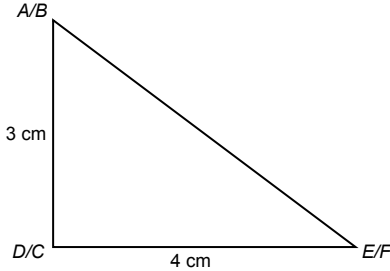
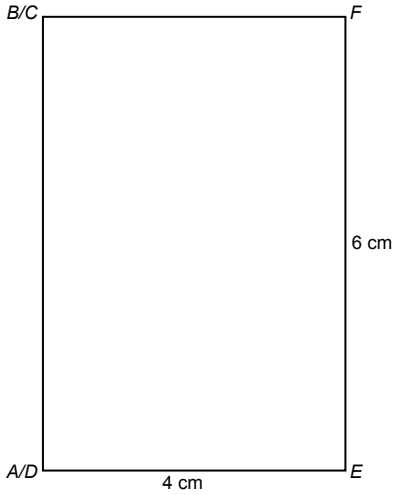
4.

| Unjuran ortogon <i>Orthogonal projection</i> | |
|--|--|
| (a) |  <p style="text-align: center;">4 cm</p> |
| (b) |  <p style="text-align: center;">5 cm</p> <p style="text-align: right;">4 cm</p> |
| (c) |  <p style="text-align: center;">4 cm</p> <p style="text-align: right;">2 cm</p> |

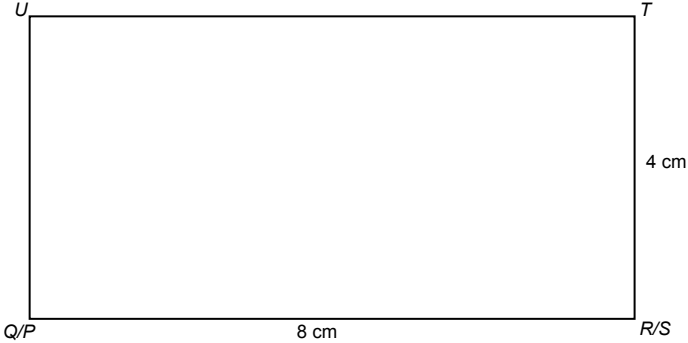
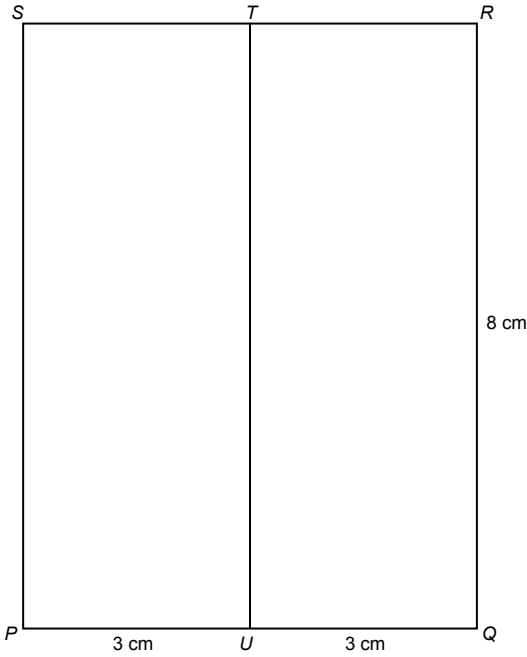
| | |
|-----|---|
| (d) |  <p style="text-align: center;">2.5 cm 2.5 cm</p> <p style="text-align: right;">4 cm</p> |
| (e) |  <p style="text-align: center;">1 cm 2 cm</p> <p style="text-align: right;">4 cm</p> |
| (f) |  <p style="text-align: right;">3 cm</p> <p style="text-align: right;">2 cm</p> <p style="text-align: center;">2 cm</p> |

5. (a)
- (b)
- (d)

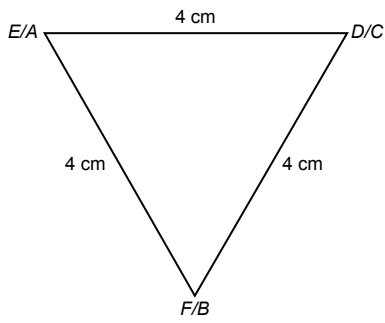
6. (a)

| <p style="text-align: center;">Lukisan unjuran ortogon <i>Drawing of orthogonal projection</i></p> | <p style="text-align: center;">Perbandingan antara pepejal dengan unjuran ortogon <i>Comparison between the solid and its orthogonal projection</i></p> |
|--|---|
| <p>(i) pada satah mencancang <i>onto the vertical plane</i></p>  | <p>bagi satah <i>ADE</i> <i>for the plane ADE</i></p> <p>Semua panjang sisi, saiz sudut dan bentuk <i>ADE</i> adalah sama dengan prisma itu. <i>All the edges, angles and shape ADE are the same as the prism.</i></p> |
| <p>(ii) pada satah mengufuk <i>onto the horizontal plane</i></p>  | <p>bagi satah <i>ABFE</i> dan <i>DCFE</i> <i>for the planes ABFE and DCFE</i></p> <p>Sama/<i>Same</i>: <i>AB, EF, DC, CF, DE;</i> semua sudut tegak; <i>all the right angles;</i> bentuk/ <i>shape DCFE</i></p> <p>Berbeza/<i>Different</i>: <i>AE, BF;</i> bentuk/ <i>shape ABFE</i></p> |

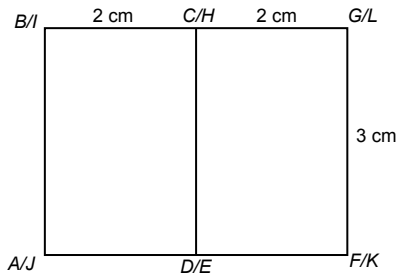
(b)

| <p style="text-align: center;">Lukisan unjuran ortogon <i>Drawing of orthogonal projection</i></p> | <p style="text-align: center;">Perbandingan antara pepejal dengan unjuran ortogon <i>Comparison between the solid and its orthogonal projection</i></p> |
|---|--|
| <p>(i) pada satah mencancang <i>onto the vertical plane</i></p>  | <p>bagi satah <i>QRTU</i> <i>for the plane QRTU</i></p> <p>Sama/Same: <i>QR, UT;</i> semua sudut tegak <i>all the right angles</i></p> <p>Berbeza/ Different: <i>QU, RT;</i> bentuk/ <i>shape QRTU</i></p> |
| <p>(ii) pada satah mengufuk <i>onto the horizontal plane</i></p>  | <p>bagi satah <i>PQRS</i> dan <i>PSTU</i> <i>for the planes PQRS and PSTU</i></p> <p>Sama/Same: <i>PQ, RS, PS, QR, UT;</i> semua sudut tegak; <i>all the right angles;</i> bentuk/ <i>shape PQRS</i></p> <p>Berbeza/ Different: <i>PU, ST;</i> bentuk/ <i>shape PSTU</i></p> |

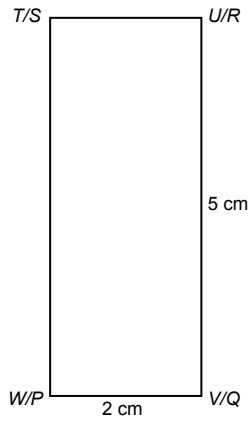
7. (a)



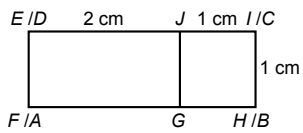
(b)



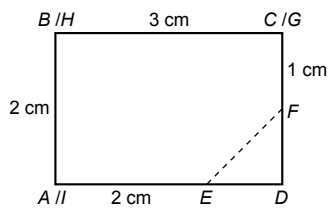
(c)



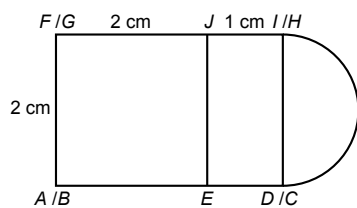
(d)



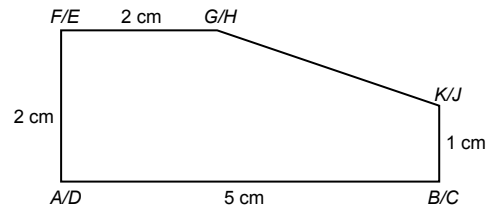
(e)



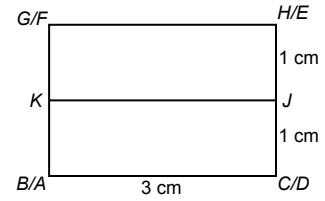
(f)



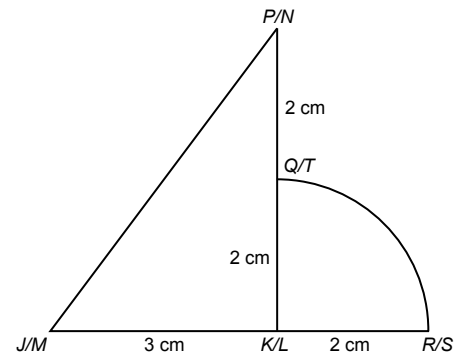
8. (a) (i)



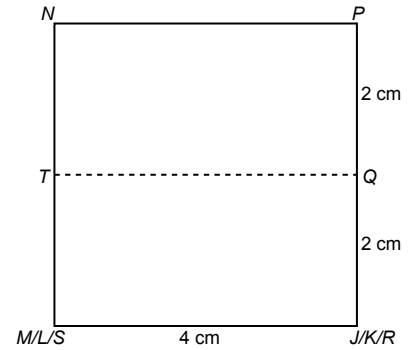
(ii)



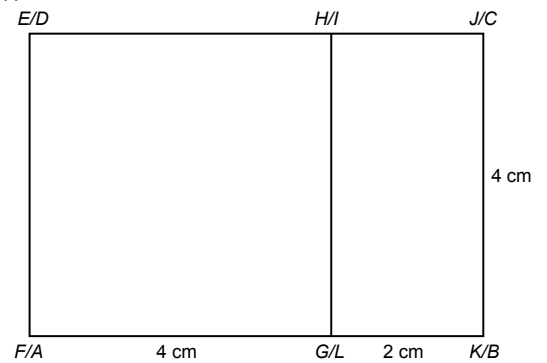
(b) (i)

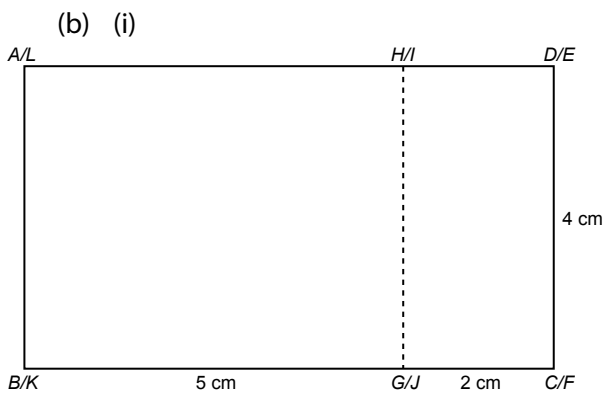
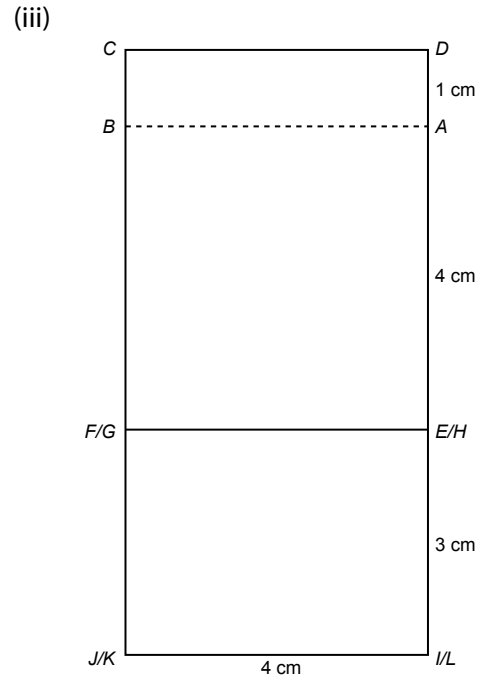
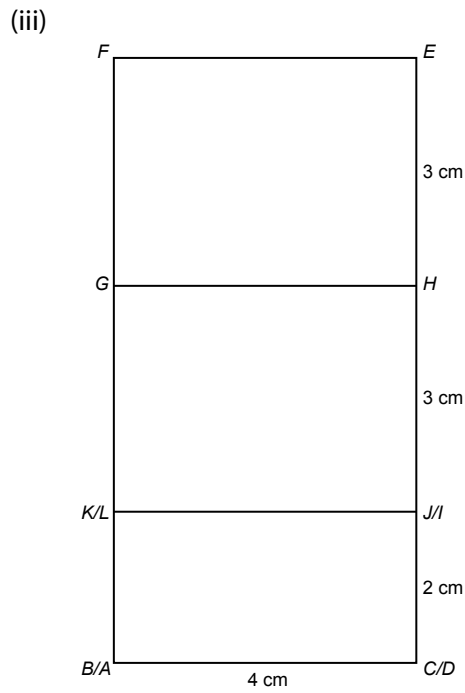
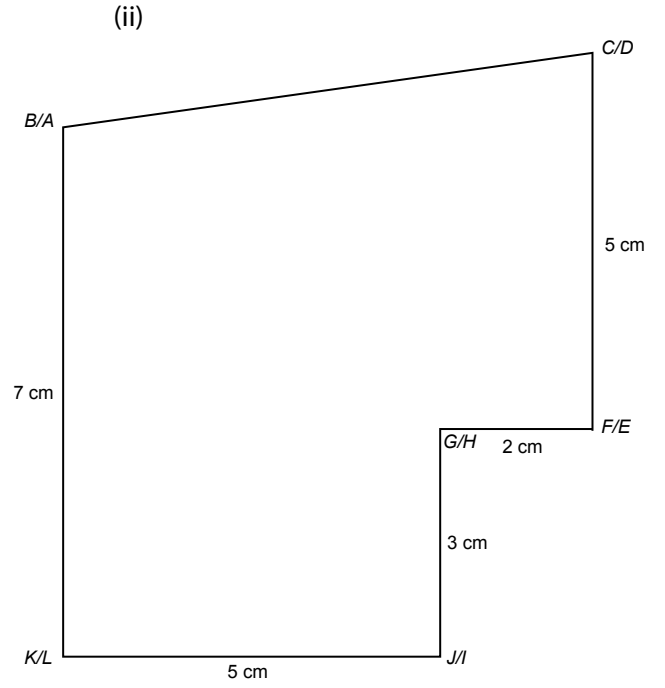
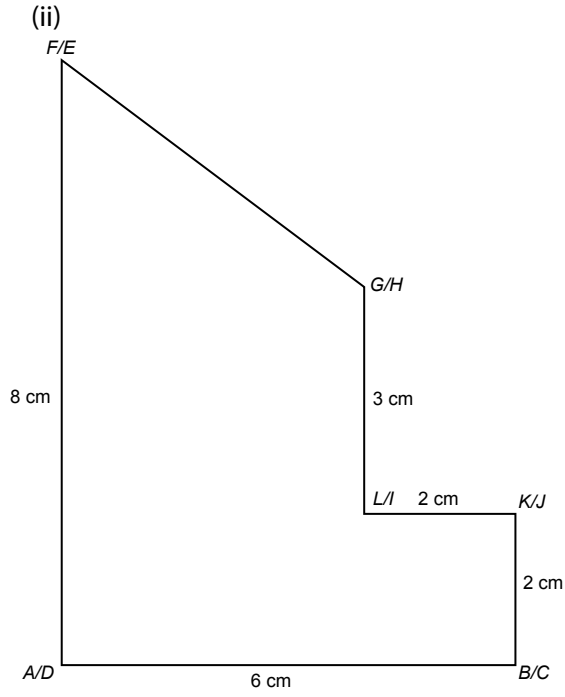


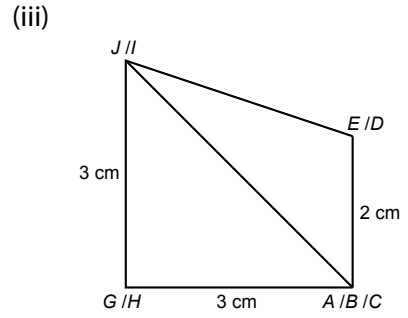
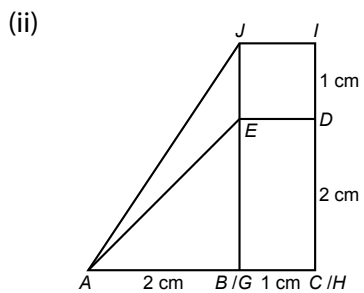
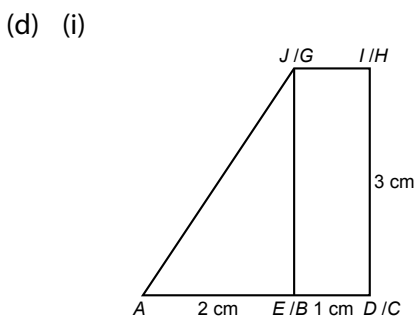
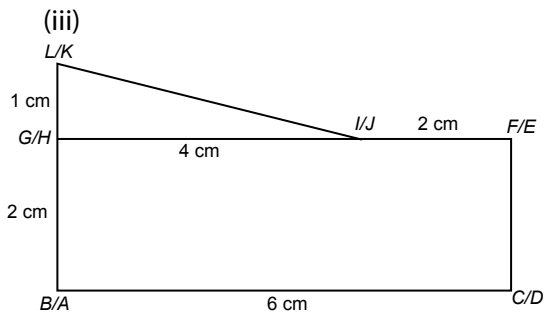
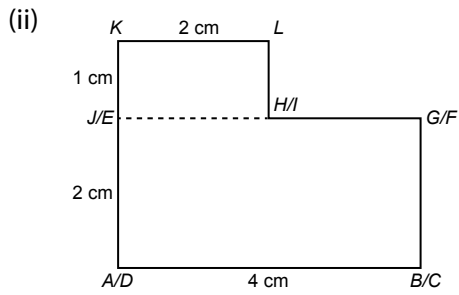
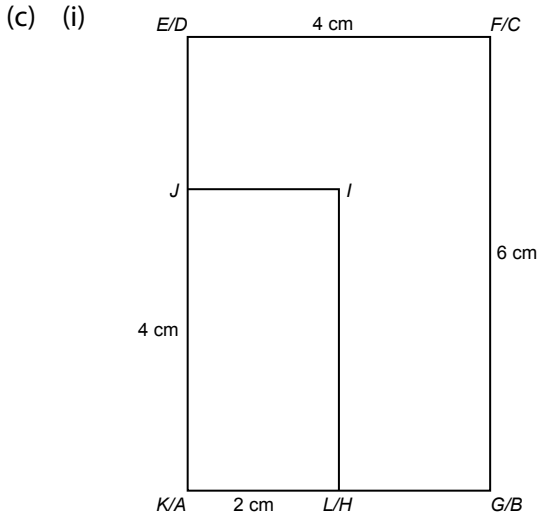
(ii)



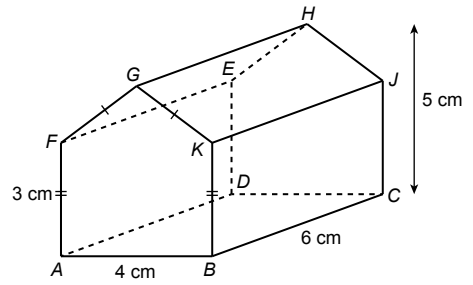
9. (a) (i)



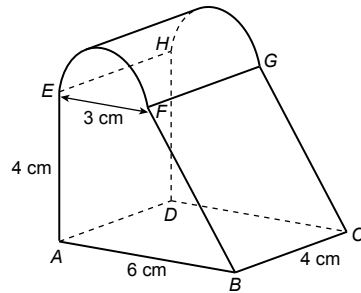




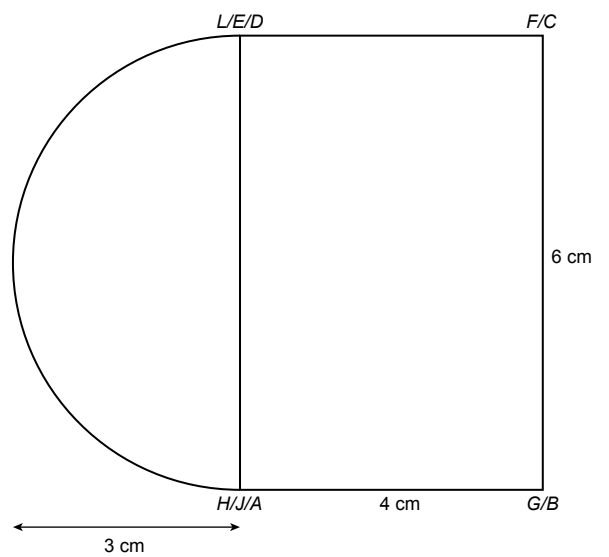
10. (a)

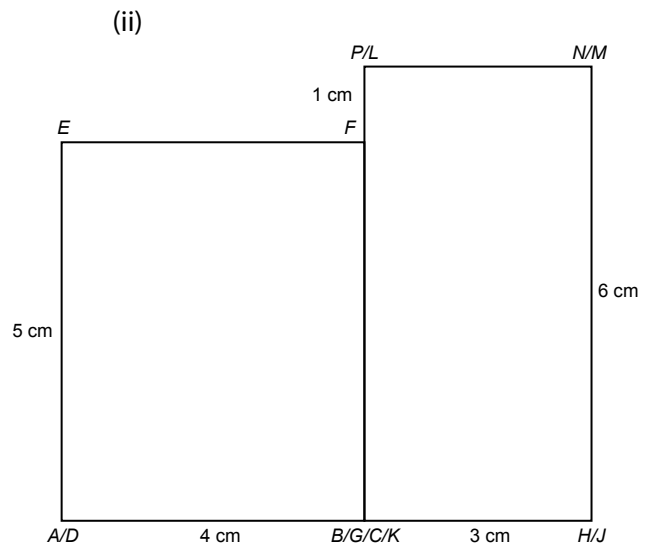
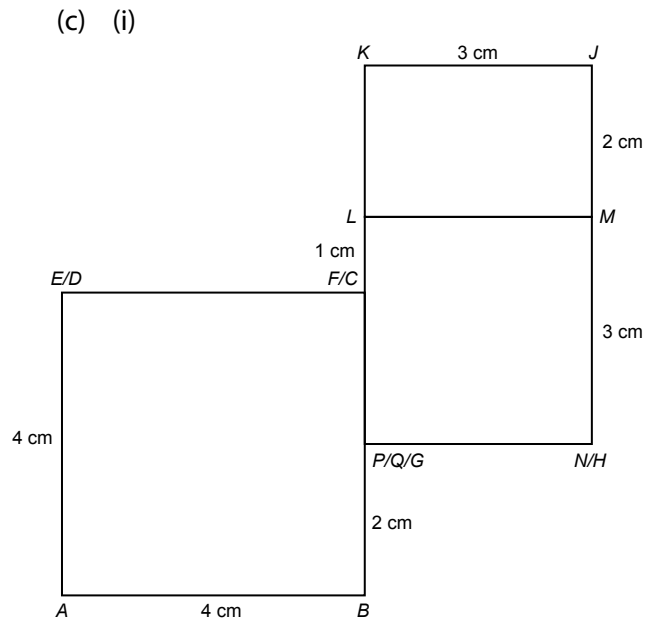
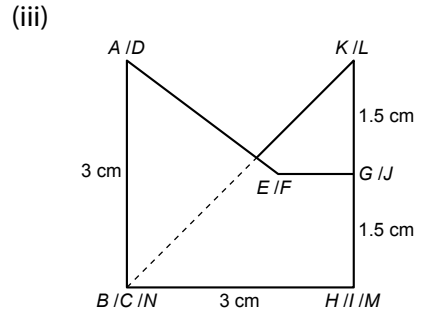
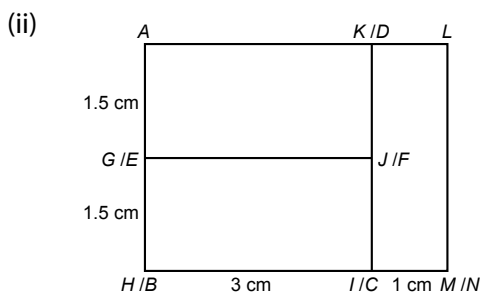
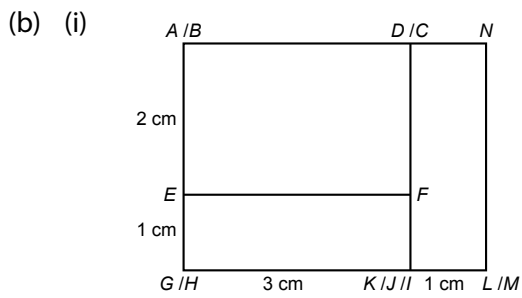
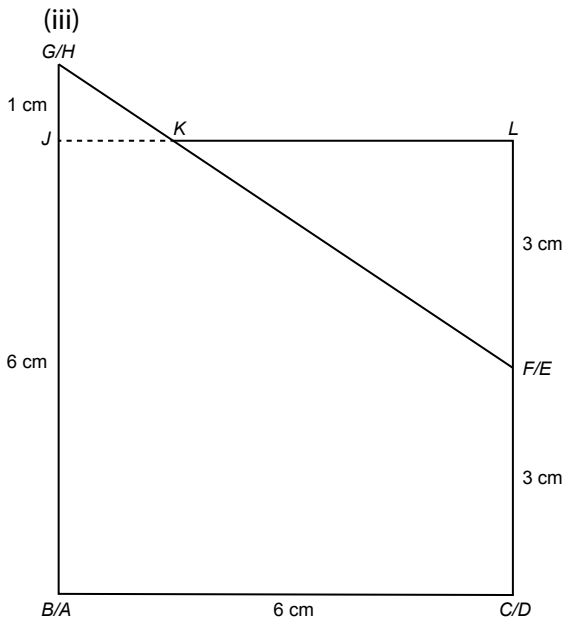
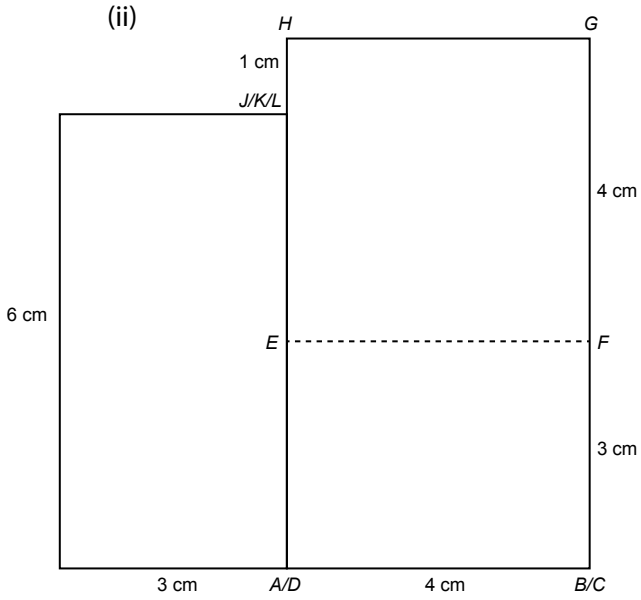


(b)

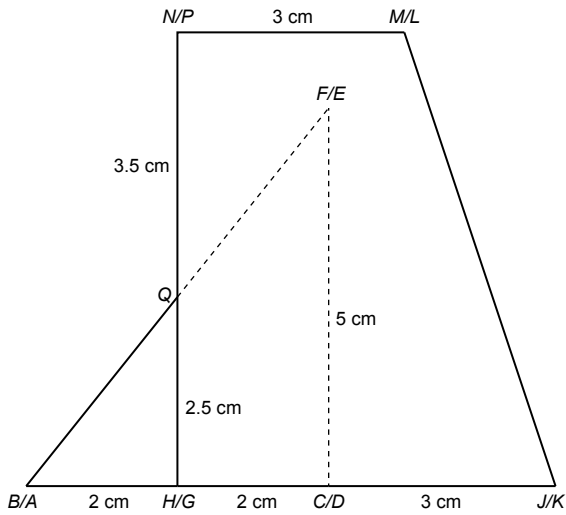


11. (a) (i)

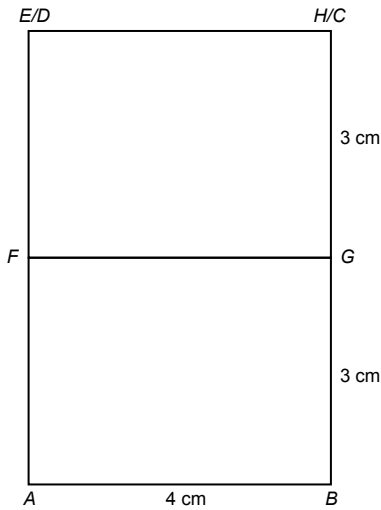




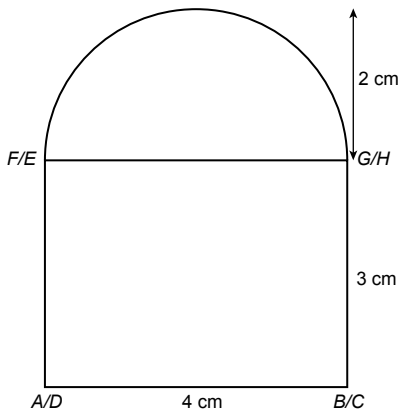
(iii)



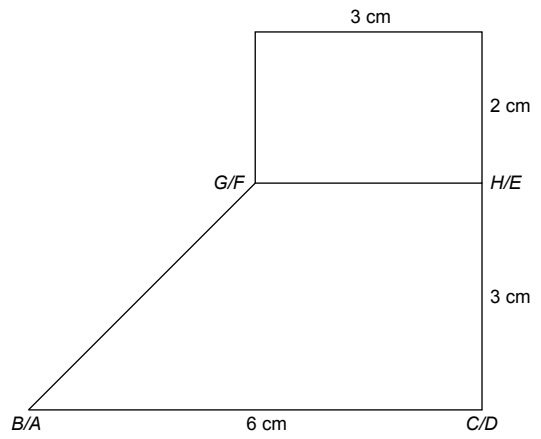
(d) (i)



(ii)



(iii)



Isi padu gabungan pepejal

Volume of composite solid

= Isi padu prisma + Isi padu separuh silinder

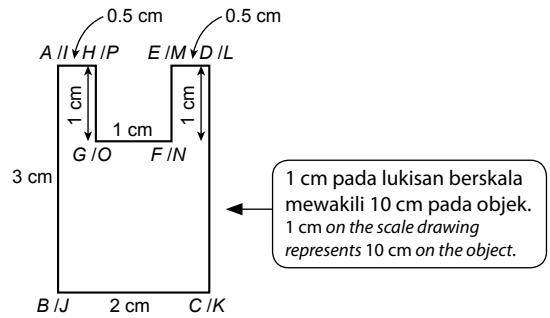
Volume of prism + Volume of half cylinder

$$= \frac{1}{2}(3 + 6) \times 3 \times 4 + \frac{1}{2} \times 3.142 \times 2^2 \times 3$$

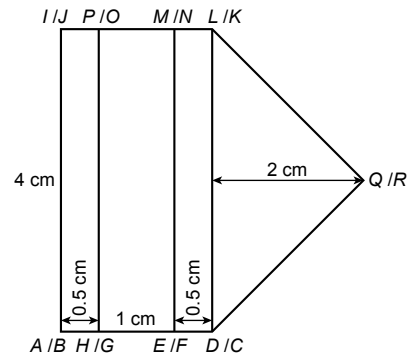
$$= 54 + 18.852$$

$$= 72.852 \text{ cm}^3$$

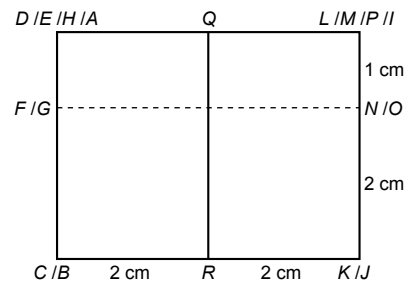
12. (a)



(b) (i)

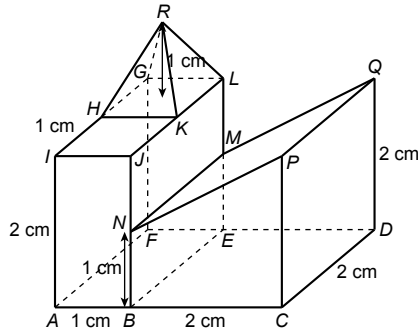


(ii)



13. (a) Silinder / Cylinder
 (b) Isi padu / Volume
 $= 3.142 \times 1^2 \times 1$
 $= 3.142 \text{ m}^3$

14. (a)



(b) Satu piramid, satu kuboid dan satu prisma
 A pyramid, a cuboid and a prism

(c) Luas tapak / Base area
 $= 2 \times 3$
 $= 6 \text{ cm}^2$

(d) Isi padu / Volume
 $=$ isi padu kuboid + isi padu piramid
 $+$ isi padu prisma
volume of cuboid + volume of pyramid + volume of prism
 $= 1 \times 2 \times 2 + \frac{1}{3} \times 1 \times 1 \times 1 + \frac{1}{2} \times (2 + 1) \times 2 \times 2$
 $= 4 + \frac{1}{3} + 6$
 $= 10\frac{1}{3} \text{ cm}^3$

Power PT3

Bahagian **A**

1. Unjuran ortogon yang betul:
 Correct orthogonal projection:



Jawapan / Answer: **B**

2. Isi padu / Volume = 72 cm^3
 Tinggi / Height = 12 cm

Unjuran ortogon yang diberi ialah keratan rentas seragam prisma itu.
 The given orthogonal projection is the uniform cross section of the prism.

Isi padu = Luas keratan rentas \times Tinggi
 Volume = Area of cross section \times Height

$$72 = \frac{1}{2} \times 3 \times AB \times 12$$

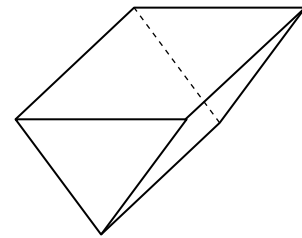
$$72 = 18 \times AB$$

$$AB = \frac{72}{18}$$

$$= 4 \text{ cm}$$

Jawapan / Answer: **B**

3. Bentuk pepejal yang mungkin:
 The possible solid:

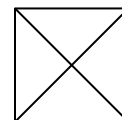


Jawapan / Answer: **C**

4. **D** adalah benar.
D is true.

Jawapan / Answer: **D**

5. Pelan gabungan pepejal itu:
 The plan of the composite solid:



Jawapan / Answer: **D**

Bahagian **B**

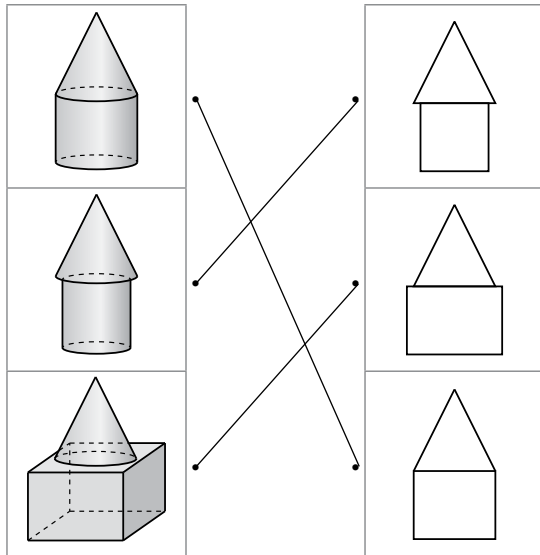
6. (a)

(b)

(c)

(d)

7. (a)

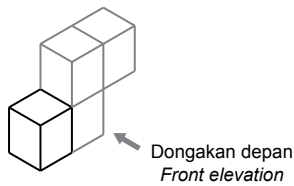


[3 markah / 3 marks]

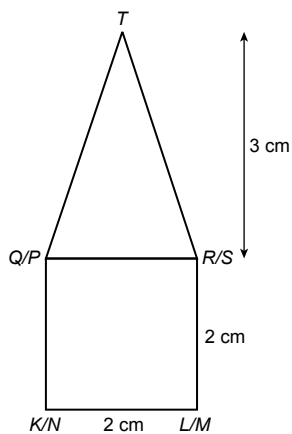
(b) Pelan ialah unjuran ortogon pada satah mengufuk sebagaimana dilihat dari pandangan (atas/ sisi / depan) suatu objek. *Plan is the orthogonal projection onto the horizontal plane as viewed from the (top/ side / front) of an object.*

Bahagian C

8. (a)

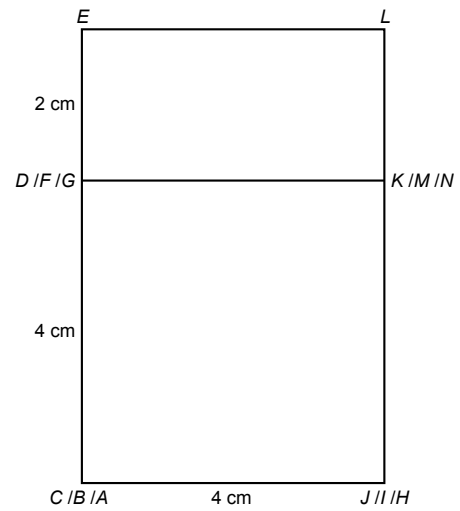


(a) (i)



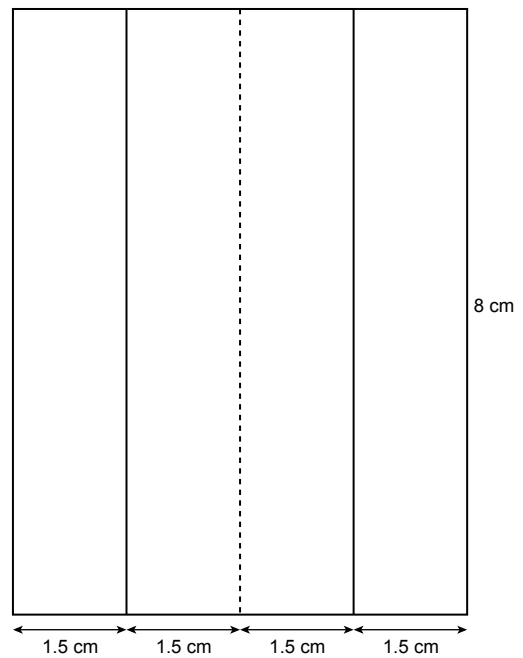
(ii) Tidak/ No

(c)

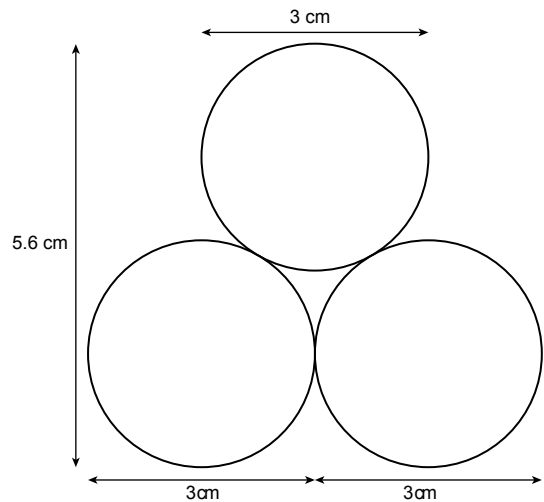


Power KBAT

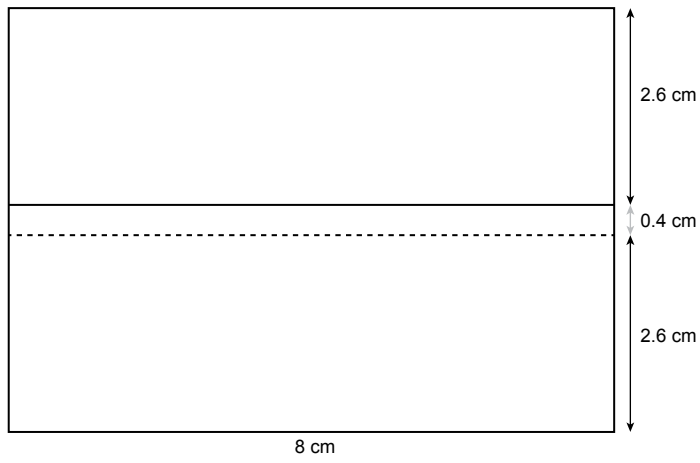
1. (i)



(ii)



(iii)



JAWAPAN

BAB 8

Lokus dalam Dua Dimensi Loci in Two Dimensions

1.

| Situasi Situation | Kedudukan atau lokus titik M Position or locus of point M |
|----------------------|---|
| | |
| | |
| | |
| | |
| | |

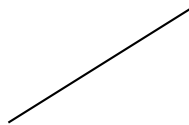
- (a) Lokus ialah satu surihan atau lintasan oleh satu set titik dalam satu satah atau ruang tiga dimensi yang memenuhi syarat-syarat tertentu.

Locus is a trail or trajectory by a set of points in a single plane or three-dimensional space that satisfies certain conditions.

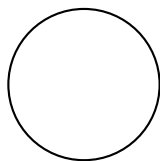
- (b) Bentuk lokus dua dimensi boleh dilihat dalam bentuk garis lurus, lengkuk dan lengkung.

The shape of two-dimensional locus can be seen in the form of straight line, arc and curve.

2. (a) **Garis lurus yang selari dengan eskalato**
A straight line that is parallel to the escalator



- (b) **Bulatan**
Circle



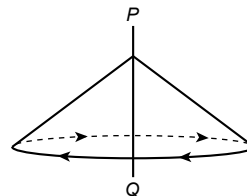
- (c) **Garis lurus yang selari dengan jalan raya**
A straight line that is parallel to the road



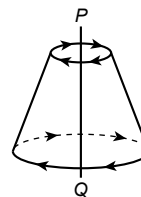
- (d) **Lengkuk**
An arc



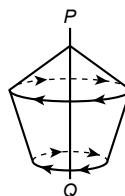
3. (a)



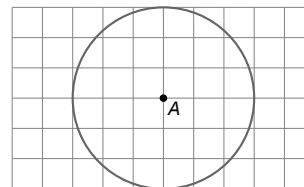
(b)



(c)

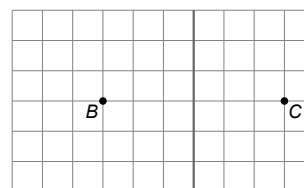


5. (a)



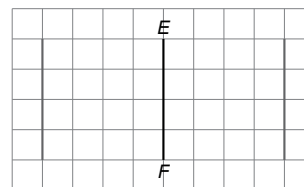
Lokus: Bulatan berpusat A
Locus: A circle with centre A

(b)

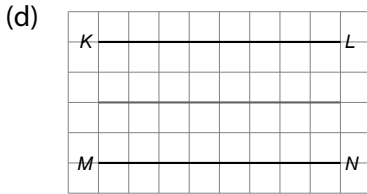


Lokus: Satu pembahagi dua sama serenjang bagi garis BC
Locus: A perpendicular bisector of the line BC

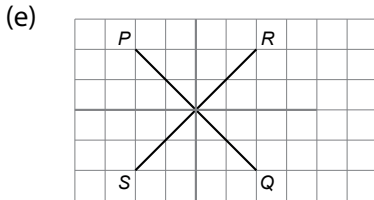
(c)



Lokus: Dua garis lurus yang selari dengan EF
Locus: Two straight lines which are parallel to EF



Lokus: Satu garis lurus yang berada di tengah-tengah KL dan MN
 Locus: A straight line that is in the middle of KL and MN



Lokus: Pembahagi dua sama sudut antara PQ dan RS
 Locus: Angle bisectors between PQ and RS

6. (a) Lokus bagi titik yang berjarak tetap dari satu titik tetap ialah bulatan dengan keadaan titik tetap itu ialah pusat dan jarak tetap itu ialah jejari.

The locus of points with a constant distance from a fixed point is a circle where the fixed point is the centre and the constant distance is the radius.

- (b) Lokus bagi titik yang berjarak sama dari dua titik tetap ialah pembahagi dua sama serenjang bagi garis lurus yang menyambungkan dua titik tetap itu.

The locus of points that are equidistant from two fixed points is a perpendicular bisector of the straight line connecting the two fixed points.

- (c) Lokus bagi titik yang berjarak tetap dari satu garis lurus ialah sepasang garis lurus yang selari dengan garis lurus itu.

The locus of points with a constant distance from a straight line is a pair of straight lines that are parallel to the straight line.

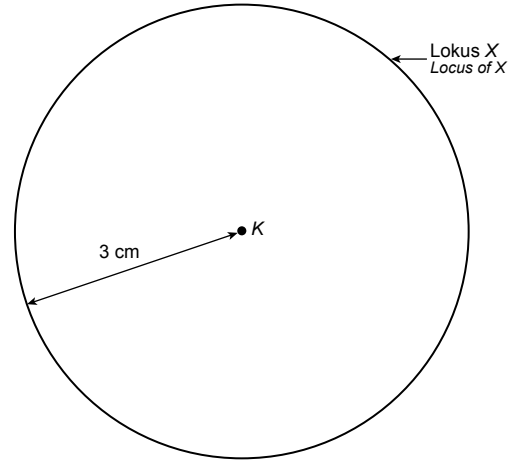
- (d) Lokus bagi titik yang berjarak sama dari dua garis lurus selari ialah satu garis lurus yang selari dan melalui titik tengah bagi kedua-dua garis lurus itu.

The locus of points that are equidistant from two parallel straight lines is a straight line that is parallel and passing through the midpoint of the two straight lines.

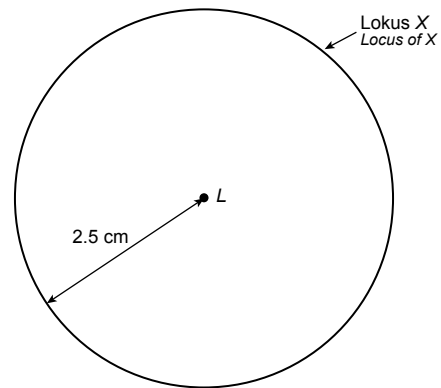
- (e) Lokus bagi titik yang berjarak sama dari dua garis lurus bersilang ialah pembahagi dua sama sudut antara dua garis lurus itu.

The locus of points that are equidistant from two intersecting straight lines is the angle bisectors between both the straight lines.

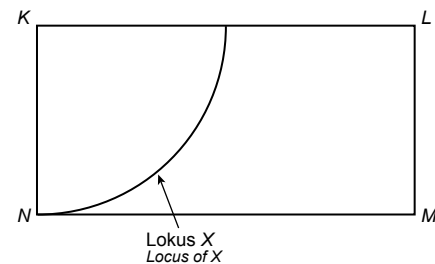
7. (a)



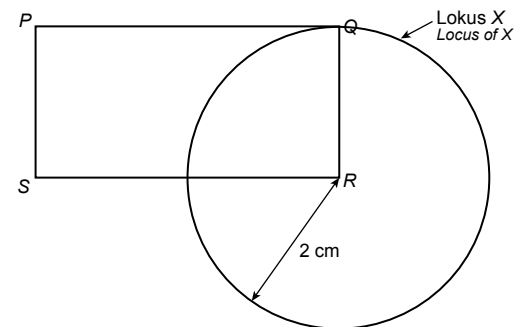
(b)

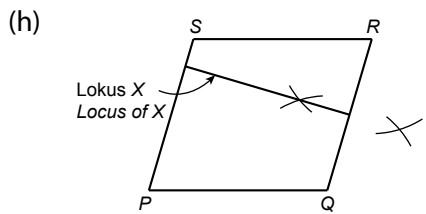
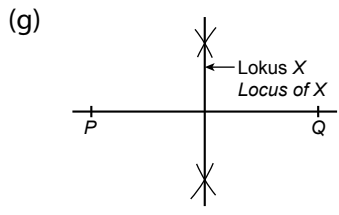
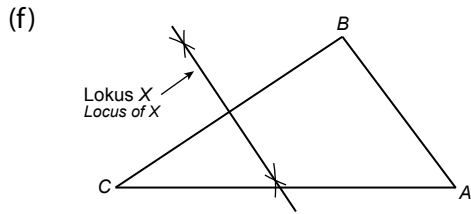
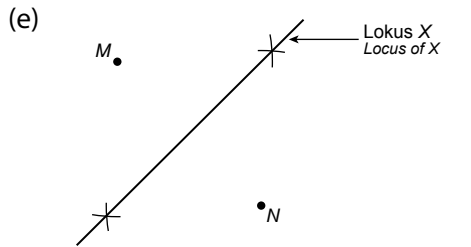


(c)

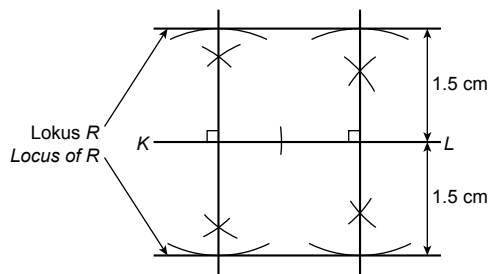


(d)

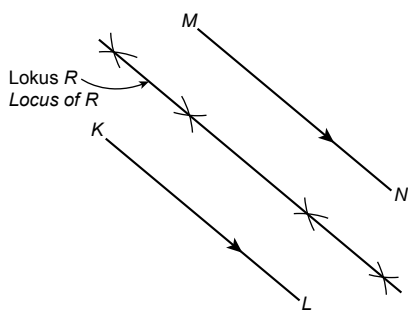




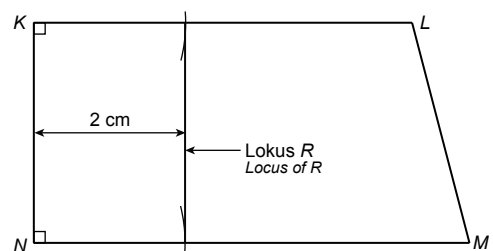
8. (a)



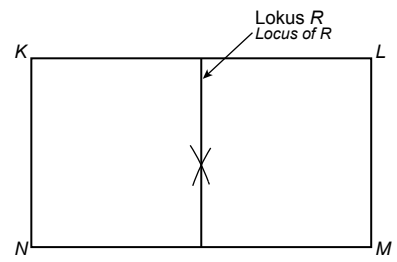
(b)



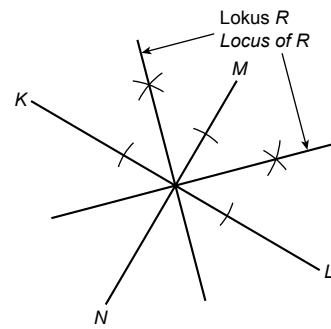
(c)



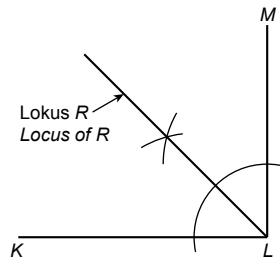
(d)



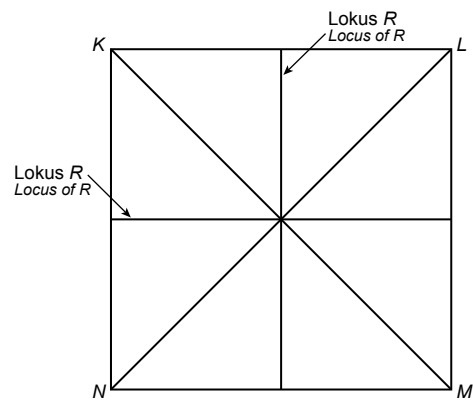
(e)



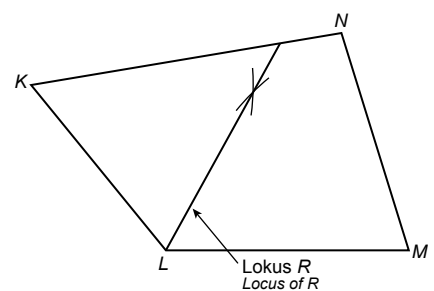
(f)



(g)

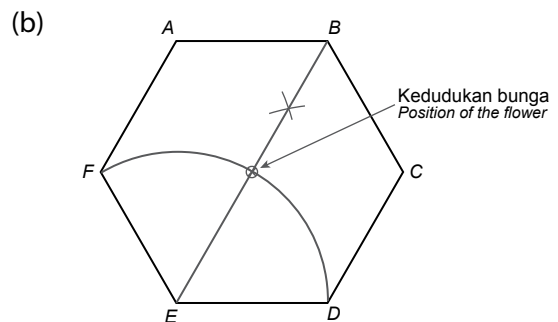
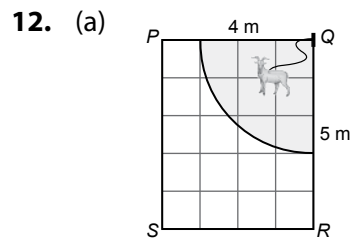
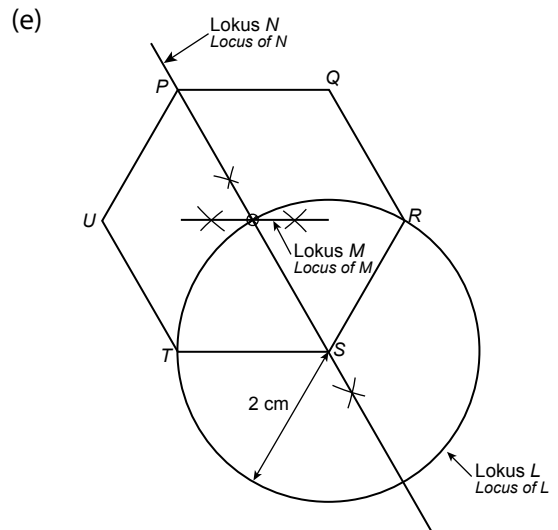
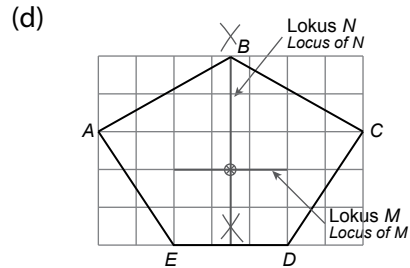
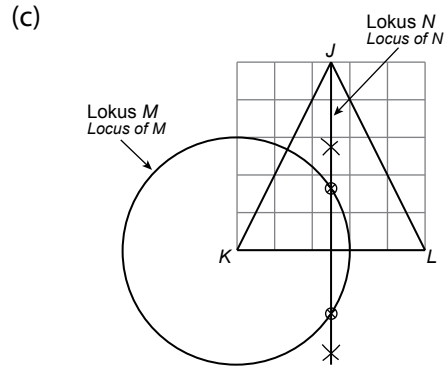
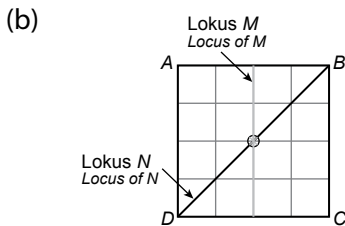
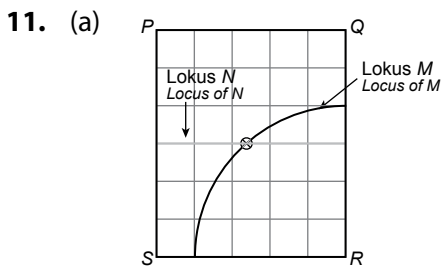


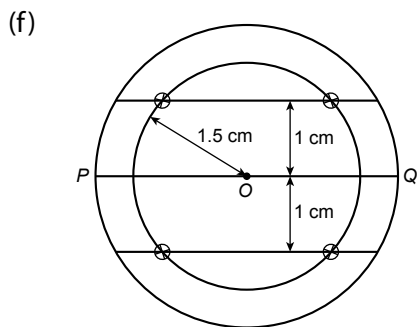
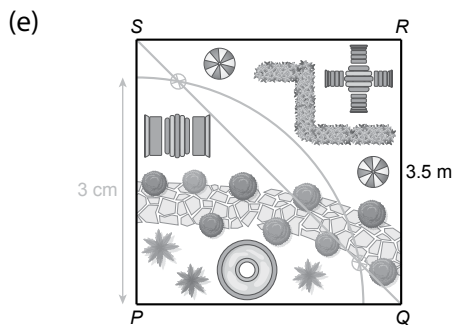
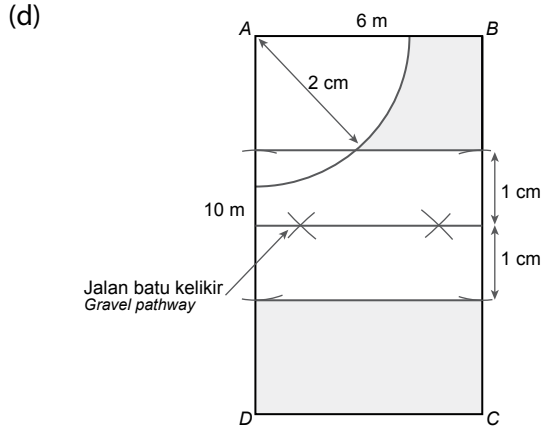
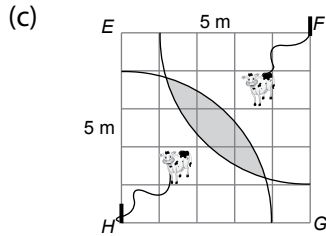
(h)



| 9. | Deskripsi Description | Lokus Locus |
|-----|---|----------------|
| (a) | Lokus bagi titik yang berjarak sama dari garis AD dan garis BC . <i>Locus of points that are equidistant from line AD and line BC.</i> | EF |
| (b) | Lokus bagi titik yang berjarak sama dari bucu B dan bucu D . <i>Locus of points that are equidistant from vertex B and vertex D.</i> | AC |
| (c) | Lokus bagi titik yang berjarak sama dari garis AC dan BD . <i>Locus of points that are equidistant from lines AC and BD.</i> | EF, GH |

10. (a) Lokus P sentiasa berjarak 1 cm dari titik D .
Locus of P is always 1 cm from point D .
- (b) Lokus P sentiasa berjarak sama dari dua garis bersilang, AD dan DC . (atau AB dan BC) (atau dua titik, A dan C)
Locus of P is always equidistant from two intersecting lines, AD and DC . (or AB and BC) (or two points, A and C)
- (c) Lokus P sentiasa berjarak sama dari dua garis selari, AB dan DC .
Locus of P is always equidistant from two parallel lines, AB and DC .
- (d) Lokus P sentiasa berjarak 1.5 cm dari garis AB .
Locus of P is always 1.5 cm from line AB .
- (e) Lokus P sentiasa berjarak sama dari dua garis bersilang, AC dan BD .
Locus of P is always equidistant from two intersecting lines, AC and BD .





Power PT3

Bahagian A

- Lokus bagi titik P berjarak tetap dari satu titik tetap.
The locus of the point P is of a fixed distance from a fixed point.
Jawapan / Answer: **A**
- B berjarak sama dari PQ dan RS .
 B is equidistant from PQ and RS .
Jawapan / Answer: **B**

- Diberi $JK = 7$ cm, T berjarak sama dari J dan K .
Given $JK = 7$ cm, T is equidistant from J and K .

$$\text{Jarak di antara } T \text{ dan } J = \frac{7 \text{ cm}}{2} = 3.5 \text{ cm}$$

Distance between T and J

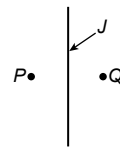
Jawapan / Answer: **A**

- X : berjarak sama dari J dan L
equidistant from J and L
 Y : berjarak tetap dari O
fixed distance from O

Titik persilangan X dan Y : K dan M
Points of intersection of X and Y : K and M

Jawapan / Answer: **D**

-



Jawapan / Answer: **D**

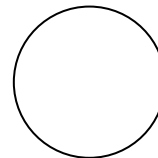
- D** paling sesuai untuk memasang nozel bagi memastikan semburan air dapat menyirami kebun secara maksimum.

D is the most suitable location to install the nozzle to make sure the water sprinkler can water the garden at maximum.

Jawapan / Answer: **D**

Bahagian B

- (a)



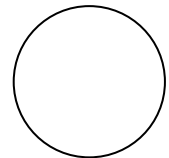
- (c)



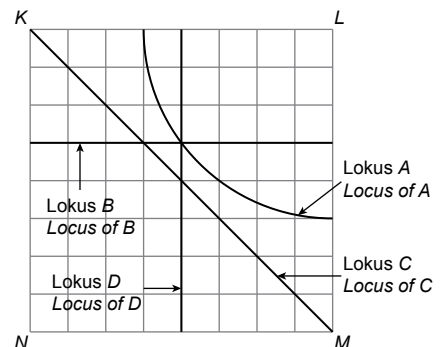
- (b)



- (d)



-



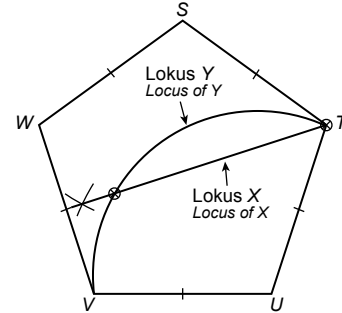
| | Huraian Description | Lokus Locus |
|-----|--|----------------|
| (a) | Lokus bagi suatu titik yang bergerak dengan keadaan jaraknya sentiasa 3 unit dari garis KL. <i>Locus of a moving point which is always 3 units from line KL.</i> | B |
| (b) | Lokus bagi suatu titik yang bergerak dengan keadaan jaraknya sentiasa 5 unit dari titik L. <i>Locus of a moving point which is always 5 units from point L.</i> | A |
| (c) | Lokus bagi suatu titik yang bergerak dengan keadaan jaraknya sentiasa sama dari garis KN dan garis LM. <i>Locus of a moving point which is always equidistant from line KN and line LM.</i> | D |
| (d) | Lokus bagi suatu titik yang bergerak dengan keadaan jaraknya sentiasa sama dari titik L dan titik N. <i>Locus of a moving point which is always equidistant from point L and point N.</i> | C |

9. (a) Lokus bagi suatu titik yang berjarak tetap dari satu titik tetap ialah bulatan.
Locus of a point which is of constant distance from a fixed point is a circle.
- (b) Lokus bagi suatu titik yang berjarak sama dari dua titik tetap ialah pembahagi dua sama serenjang.
Locus of a point which is equidistant from two fixed points is a perpendicular bisector.
- (c) Lokus bagi suatu titik yang berjarak tetap dari satu garis lurus ialah garis selari.
Locus of a point which is of constant distance from a straight line is parallel lines.
- (d) Lokus bagi suatu titik yang berjarak sama dari dua garis lurus yang bersilang ialah pembahagi dua sama sudut.
Locus of a point which is equidistant from two intersecting straight lines is an angle bisector.

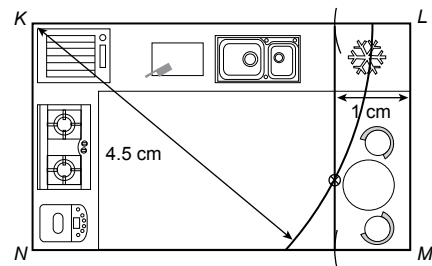
Bahagian C

10. (a) (i) Bulatan / Circle
(ii) Sepasang garis selari
A pair of parallel lines

(b)

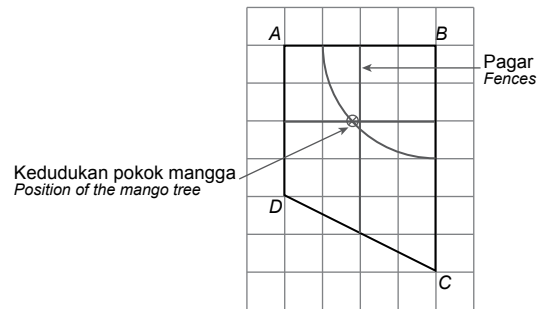


(c)

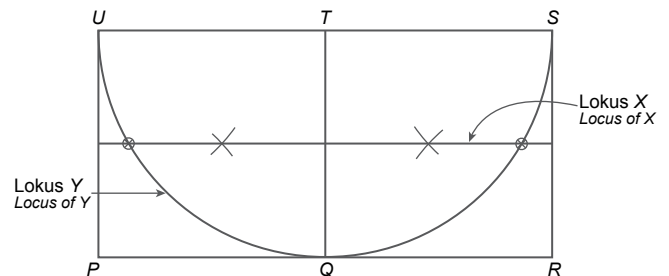


Power KBAT

1.



2.



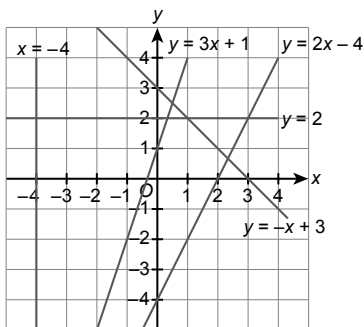
JAWAPAN

BAB
9

Garis Lurus Straight Lines

1.

| Fungsi linear Linear function | Kecerunan Gradient | Pintasan-y y-intercept |
|----------------------------------|-----------------------|---------------------------|
| $x = -4$ | ∞ | Tiada / None |
| $y = 2$ | 0 | 2 |
| $y = -x + 3$ | -1 | 3 |
| $y = 3x + 1$ | 3 | 1 |
| $y = 2x - 4$ | 2 | -4 |



- (a) Graf untuk fungsi linear, $y = mx + c$ ialah satu garis lurus .

The graph of a linear function, $y = mx + c$ is the straight line .

- (b) Diberi suatu persamaan garis lurus dalam bentuk $y = mx + c$, m ialah kecerunan dan c ialah pintasan-y .

Given an equation of a straight line in the form of $y = mx + c$, m is the gradient and c is the y-intercept .

- (c) $x = -4$ ialah satu garis lurus yang selari dengan paksi-y .

$x = -4$ is a straight line that is parallel to y-axis .

- (d) $y = 2$ ialah satu garis lurus yang selari dengan paksi-x .

$y = 2$ is a straight line that is parallel to x-axis .

2.

$$y = 4x - 5 \quad \text{Seperti} \quad y = \frac{2}{5}x + 2 \quad \text{Seperti} \quad y = -2x + \frac{1}{2}$$

(a) 4 (b) $\frac{2}{5}$ (c) -2

$$y = -7x - 2 \quad \text{Seperti} \quad y = \frac{1}{2}x + 15 \quad \text{Seperti} \quad y = \frac{5}{3}x - \frac{2}{3}$$

(d) -2 (e) 15 (f) $-\frac{2}{3}$

3. (a) $k = -1$
 $h = -3$

- (b) $k = -4$
 $h = 2$

4. (a) $ax + by = c$

$$by = -a x + c$$

$$y = -\frac{a}{b} x + \frac{c}{b}$$

- (b) $\frac{x}{a} + \frac{y}{b} = 1$

$$bx + ay = ab$$

$$y = -\frac{b}{a} x + b$$

- (c) $by + c = ax$

$$by = ax - c$$

$$y = \frac{a}{b} x - \frac{c}{b}$$

5. (a)

| Persamaan garis lurus <i>Equation of straight line</i> | Kecerunan <i>Gradient</i> | Pintasan-y <i>y-intercept</i> |
|---|------------------------------|----------------------------------|
| (a) $x + y = 4$ | -1 | 4 |
| (b) $5x - y = -7$ | 5 | 7 |
| (c) $x + 6y = -1$ | $-\frac{1}{6}$ | $-\frac{1}{6}$ |
| (d) $2x + y = 7$ | -2 | 7 |
| (e) $3x - 4y = 2$ | $\frac{3}{4}$ | $-\frac{1}{2}$ |
| (f) $14x - y = -6$ | 14 | 6 |

6.

| | Pintasan-x <i>x-intercept</i> | Pintasan-y <i>y-intercept</i> | Kecerunan <i>Gradient</i> |
|-----|----------------------------------|----------------------------------|------------------------------|
| (a) | 3 | 2 | $-\frac{2}{3}$ |
| (b) | -1 | 5 | 5 |
| (c) | 6 | -1 | $\frac{1}{6}$ |
| (d) | 2 | 6 | -3 |
| (e) | -7 | 1 | $\frac{1}{7}$ |
| (f) | -1 | -3 | -3 |

7.

| Bentuk persamaan garis lurus <i>Form of equation of straight line</i> | | |
|--|-------------------------------------|---|
| $ax + by = c$ | $\frac{x}{a} + \frac{y}{b} = 1$ | $y = mx + c$ |
| $\frac{1}{3}x + y = 2$ | $\frac{x}{6} + \frac{y}{2} = 1$ | $y = -\frac{1}{3}x + 2$ |
| $3x - 8y = 5$ | $\frac{3x}{5} - \frac{8y}{5} = 1$ | $8y = 3x - 5$ $y = \frac{3}{8}x - \frac{5}{8}$ |
| $5x + 3y = 2$ | $\frac{5x}{2} + \frac{3y}{2} = 1$ | $3y = -5x + 2$ $y = -\frac{5}{3}x + \frac{2}{3}$ |
| $x - \frac{1}{2}y = 2$ | $\frac{x}{2} - \frac{y}{4} = 1$ | $\frac{1}{2}y = x - 2$ $y = 2x - 4$ |
| $2x - \frac{5}{6}y = -3$ | $-\frac{2x}{3} + \frac{5y}{18} = 1$ | $\frac{5}{6}y = 2x + 3$ $y = \frac{12}{5}x + \frac{18}{5}$ |

Bentuk persamaan garis lurus
Form of equation of straight line

| $\frac{x}{a} + \frac{y}{b} = 1$ | $ax + by = c$ | $y = mx + c$ |
|--------------------------------------|------------------|--|
| $-\frac{3x}{2} + \frac{y}{2} = 1$ | $-3x + y = 2$ | $y = 3x + 2$ |
| $-\frac{3x}{11} + \frac{9y}{44} = 1$ | $-12x + 9y = 44$ | $9y = 12x + 44$ $y = \frac{4}{3}x + \frac{44}{9}$ |
| $\frac{8x}{7} + \frac{2y}{7} = 1$ | $8x + 2y = 7$ | $2y = -8x + 7$ $y = -4x + \frac{7}{2}$ |
| $-\frac{x}{2} - \frac{y}{6} = 1$ | $-3x - y = 6$ | $y = -3x - 6$ |
| $-\frac{x}{2} + \frac{y}{4} = 1$ | $-2x + y = 4$ | $y = 2x + 4$ |

8.

| Bentuk persamaan garis lurus <i>Form of equation of straight line</i> | | |
|--|------------------|-----------------------------------|
| $y = mx + c$ | $ax + by = c$ | $\frac{x}{a} + \frac{y}{b} = 1$ |
| $y = 4x + 9$ | $-4x + y = 9$ | $-\frac{4x}{9} + \frac{y}{9} = 1$ |
| $y = 7x + 3$ | $-7x + y = 3$ | $-\frac{7x}{3} + \frac{y}{3} = 1$ |
| $y = \frac{10}{3}x + 5$ | $-10x + 3y = 15$ | $-\frac{2x}{3} + \frac{y}{5} = 1$ |
| $y = -\frac{5}{3}x + \frac{8}{3}$ | $5x + 3y = 8$ | $\frac{5x}{8} + \frac{3y}{8} = 1$ |
| $y = -\frac{7}{4}x + 7$ | $7x + 4y = 28$ | $\frac{x}{4} + \frac{y}{7} = 1$ |

9. (a)

| | |
|---------|--------|
| A(0, 1) | |
| y | 2x + 1 |
| 1 | 1 |

| | |
|---------|--------|
| B(1, 3) | |
| y | 2x + 1 |
| 3 | 3 |

| | |
|---------|--------|
| C(5, 5) | |
| y | 2x + 1 |
| 5 | 11 |

| | |
|---------|--------|
| D(4, 1) | |
| y | 2x + 1 |
| 1 | 9 |

- (b) Sekiranya nilai-nilai koordinat x dan y bagi suatu titik diganti ke dalam persamaan garis lurus, dan nilai sebelah kiri sama dengan nilai sebelah kanan, maka titik tersebut _____ terletak _____ pada garis lurus tersebut dan sebaliknya. Titik-titik pada garis lurus atau titik-titik yang dilalui oleh garis lurus akan _____ memenuhi _____ persamaan garis lurus.

If the values of x and y coordinates of a point are substituted into the equation of a straight line, and the values of the left hand side equals to the right hand side, then the point _____ lies on _____ the straight line and vice versa. The points on the straight line or the points passed by the straight line will _____ satisfy _____ the equation of the straight line.

10. (a) Sebelah kiri:

Left hand side:

$$2x + y = 2(3) + (-7) \\ = -1$$

Sebelah kanan:

Right hand side:

$$3 \\ -1 \neq 3$$

Titik P tidak terletak pada garis lurus.

Point P is not on the straight line.

- (b) Sebelah kiri:

Left hand side:

$$3x - 4y = 3(8) - 4(6) \\ = 0$$

Sebelah kanan:

Right hand side:

$$-4 \\ 0 \neq -4$$

Titik P tidak terletak pada garis lurus.

Point P is not on the straight line.

- (c) Sebelah kiri:

Left hand side:

$$\frac{x}{4} + \frac{y}{8} = \frac{-0.5}{4} + \frac{9}{8} \\ = 1$$

Sebelah kanan:

Right hand side:

$$1 \\ 1 = 1$$

Titik P terletak pada garis lurus.

Point P is on the straight line.

- (d) Sebelah kiri:

Left hand side:

$$-\frac{x}{2} + \frac{y}{3} = -\frac{2}{2} + \frac{5}{3} \\ = \frac{2}{3}$$

Sebelah kanan:

Right hand side:

$$1 \\ \frac{2}{3} \neq 1$$

Titik P tidak terletak pada garis lurus.

Point P is not on the straight line.

- (e) Sebelah kiri:

Left hand side:

$$y = 3$$

Sebelah kanan:

Right hand side:

$$5 - 4x = 5 - 4\left(\frac{1}{2}\right) \\ = 3$$

$$3 = 3$$

Titik P terletak pada garis lurus.

Point P is on the straight line.

11. (a) $y = 5x + 1$

$$k = 5(4) + 1 \\ = 20 + 1 \\ = 21$$

- (b) $y = -3x - k$

$(0, -5)$ ialah pintasan- y .
is a y -intercept.

Maka, / Hence,

$$k = 5$$

- (c) $2y = 3x + 1$

$$2(5) = 3k + 1 \\ 10 = 3k + 1 \\ 3k = 9 \\ k = 3$$

- (d) $y = kx + 7$

$$3 = k(1) + 7 \\ k = 3 - 7 \\ = -4$$

- (e) $y = -2x + k$

$$-\frac{3}{2} = -2(1) + k \\ k = \frac{1}{2}$$

- (f) $y = kx - 3$

$$7 = k(-2) - 3 \\ -2k = 10 \\ k = -5$$

- (g) (i) m ialah pintasan- y

m is y -intercept

$$3(0) + 2m = 6 \\ 2m = 6 \\ m = 3$$

(ii) n ialah pintasan- x
 n is x -intercept
 $3n + 2(0) = 6$
 $3n = 6$
 $n = 2$

(iii) $3(3) + 2k = 6$
 $9 + 2k = 6$
 $2k = -3$
 $k = -\frac{3}{2}$

(iv) Kecerunan/ Gradient
 $= -\frac{\text{pintasan-}y}{\text{pintasan-}x} / -\frac{y\text{-intercept}}{x\text{-intercept}}$
 $= -\frac{3}{2}$

12. (a)

| | | | |
|--------------------------------|-------------|---------|------------------------|
| | $y = x + 2$ | $y = x$ | $y = \frac{3}{2}x - 3$ |
| Kecerunan/ Gradient | 1 | 1 | $\frac{3}{2}$ |

(b) Sekiranya kecerunan kedua-dua garis lurus adalah sama, maka garis-garis lurus tersebut adalah _____ selari _____.

If the gradients of both straight lines are equal, then the straight lines are _____ parallel _____.

13. (a) $m_{PQ} = \frac{9-3}{6-1}$ $m_{RS} = \frac{11-5}{12-7}$
 $= \frac{6}{5}$ $= \frac{6}{5}$

$m_{PQ} = m_{RS}$
 PQ selari dengan RS.
 PQ is parallel to RS.

(b) $m_{PQ} = \frac{7-(-2)}{2-5}$ $m_{RS} = \frac{9-(-1)}{7-8}$
 $= \frac{9}{-3}$ $= \frac{10}{-1}$
 $= -3$ $= -10$

$m_{PQ} \neq m_{RS}$
 PQ tidak selari dengan RS.
 PQ is not parallel to RS.

(c) $m_{PQ} = \frac{9-5}{-3-(-1)}$ $m_{RS} = \frac{7-1}{2-5}$
 $= \frac{4}{-2}$ $= \frac{6}{-3}$
 $= -2$ $= -2$

$m_{PQ} = m_{RS}$
 PQ selari dengan RS.
 PQ is parallel to RS.

14. (a) $m_1 = \frac{3}{2}$ $y = \frac{3}{2}x - 1$
 $m_2 = \frac{3}{2}$

Kecerunan adalah sama.
 Gradients are equal.
 \therefore Selari / Parallel

(b) $m_1 = \frac{4}{5}$ $4y = -5x - 4$
 $y = -\frac{5}{4}x - 1$
 $m_2 = -\frac{5}{4}$

Kecerunan adalah tidak sama.
 Gradients are not equal.
 \therefore Tidak selari / Not parallel

(c) $y = \frac{1}{3}x + 8$, $y = \frac{1}{3}x - 4$
 $m_1 = \frac{1}{3}$ $m_2 = \frac{1}{3}$

Kecerunan adalah sama.
 Gradients are equal.
 \therefore Selari / Parallel

(d) $-2x - 5y = 10$ $y = -\frac{3}{5}x + 2$
 $-5y = 2x + 10$
 $y = -\frac{2}{5}x - 2$

$m_1 = -\frac{2}{5}$ $m_2 = -\frac{3}{5}$

Kecerunan adalah tidak sama.
 Gradients are not equal.
 \therefore Tidak selari / Not parallel

(e) $2y = 5x - 8$, $4x - 3y = 1$
 $y = \frac{5}{2}x - 4$ $3y = 4x - 1$
 $y = \frac{4}{3}x - \frac{1}{3}$

$m_1 = \frac{5}{2}$ $m_2 = \frac{4}{3}$

Kecerunan adalah tidak sama.
 Gradients are not equal.
 \therefore Tidak selari / Not parallel

(c) $(-7, -2)$; Pintasan-y/ *y*-intercept = 3

$$\begin{aligned} y &= mx + c \\ -2 &= m(-7) + 3 \\ -7m &= -2 - 3 \\ -7m &= -5 \\ m &= \frac{5}{7} \end{aligned}$$

Persamaan/ Equation: $y = \frac{5}{7}x + 3$

(d) $(\frac{5}{2}, \frac{5}{4})$; Pintasan-y/ *y*-intercept = $-\frac{25}{4}$

$$\begin{aligned} y &= mx + c \\ \frac{5}{4} &= m\left(\frac{5}{2}\right) - \frac{25}{4} \\ \frac{5}{2}m &= \frac{5}{4} + \frac{25}{4} \\ \frac{5}{2}m &= \frac{15}{2} \\ m &= 3 \end{aligned}$$

Persamaan/ Equation: $y = 3x - \frac{25}{4}$

20. (a) $(2, -1)$; $(5, 0)$

$$\begin{aligned} m &= \frac{-1 - 0}{2 - 5} \\ &= \frac{-1}{-3} \\ &= \frac{1}{3} \end{aligned}$$

$$y = \frac{1}{3}x + c$$

Pada / At $(5, 0)$

$$0 = \frac{1}{3}(5) + c$$

$$c = -\frac{5}{3}$$

Persamaan/ Equation:

$$y = \frac{1}{3}x - \frac{5}{3}$$

(b) $(1, -7)$; $(0, 3)$

$$\begin{aligned} m &= \frac{-7 - 3}{1 - 0} \\ &= -10 \end{aligned}$$

$$y = -10x + c$$

Pada / At $(0, 3)$

$$3 = -10(0) + c$$

$$c = 3$$

Persamaan/ Equation:

$$y = -10x + 3$$

(c) $(8, -3)$; $(6, 6)$

$$\begin{aligned} m &= \frac{6 - (-3)}{6 - 8} \\ &= -\frac{9}{2} \end{aligned}$$

$$y = -\frac{9}{2}x + c$$

Pada / At $(6, 6)$

$$6 = -\frac{9}{2}(6) + c$$

$$\begin{aligned} c &= 6 + 27 \\ &= 33 \end{aligned}$$

Persamaan/ Equation:

$$y = -\frac{9}{2}x + 33$$

(d) $(-2, -5)$; $(1, 4)$

$$\begin{aligned} m &= \frac{4 - (-5)}{1 - (-2)} \\ &= \frac{9}{3} \\ &= 3 \end{aligned}$$

$$y = 3x + c$$

Pada / At $(1, 4)$

$$4 = 3(1) + c$$

$$\begin{aligned} c &= 4 - 3 \\ &= 1 \end{aligned}$$

Persamaan/ Equation:

$$y = 3x + 1$$

(e) $(-6, 7)$; $(-4, 9)$

$$\begin{aligned} m &= \frac{9 - 7}{-4 - (-6)} \\ &= \frac{2}{2} \\ &= 1 \end{aligned}$$

$$y = x + c$$

Pada / At $(-6, 7)$

$$7 = -6 + c$$

$$\begin{aligned} c &= 7 + 6 \\ &= 13 \end{aligned}$$

Persamaan/ Equation:

$$y = x + 13$$

21.

| Persamaan garis lurus Equation of straight line | |
|--|---|
| (a) | $\frac{x}{2} + \frac{y}{3} = 1$ atau/or $y = -\frac{3}{2}x + 3$ |
| (b) | $-\frac{x}{3} + \frac{y}{5} = 1$ atau/or $y = \frac{5}{3}x + 5$ |
| (c) | $\frac{x}{6} - \frac{y}{4} = 1$ atau/or $y = \frac{2}{3}x - 4$ |

22. (a) $P(2, 7); 5x - 2y = 3$

$$\begin{aligned}
 5x - 2y &= 3 & y &= \frac{5}{2}x + c \\
 2y &= 5x - 3 & \text{Pada/ At } (2, 7) \\
 y &= \frac{5}{2}x - \frac{3}{2} & 7 &= \frac{5}{2}(2) + c \\
 \therefore m &= \frac{5}{2} & c &= 2 \\
 & & \therefore y &= \frac{5}{2}x + 2
 \end{aligned}$$

(b) $P(-12, 8); \frac{5}{17}x + \frac{4}{17}y = 1$

$$\begin{aligned}
 \frac{5}{17}x + \frac{4}{17}y &= 1 & y &= -\frac{5}{4}x + c \\
 5x + 4y &= 17 & \text{Pada/ At } (-12, 8) \\
 4y &= -5x + 17 & 8 &= -\frac{5}{4}(-12) + c \\
 y &= -\frac{5}{4}x + \frac{17}{4} & c &= -7 \\
 \therefore m &= -\frac{5}{4} & \therefore y &= -\frac{5}{4}x - 7
 \end{aligned}$$

23. (a) $m = \frac{6 - (-2)}{0 - 4}$
 $= \frac{8}{-4}$
 $= -2$

$$\begin{aligned}
 y &= -2x + c \\
 \text{Pada/ At } (0, 6), \\
 6 &= -2(0) + c \\
 c &= 6 \\
 y &= -2x + 6
 \end{aligned}$$

(b) $m = \frac{-2 - 1}{5 - 11}$
 $= \frac{-3}{-6}$
 $= \frac{1}{2}$

$$\begin{aligned}
 y &= \frac{1}{2}x + c \\
 \text{Pada/ At } (11, 1), \\
 1 &= \frac{1}{2}(11) + c \\
 c &= 1 - \frac{11}{2} \\
 &= -\frac{9}{2} \\
 y &= \frac{1}{2}x - \frac{9}{2}
 \end{aligned}$$

(c) $y = 3$

(d) $x = \frac{3}{2}$

(e) $\frac{x}{8} + \frac{y}{5} = 1$ atau/or $y = -\frac{5}{8}x + 5$

(f) $\frac{x}{3} - \frac{y}{2} = 1$ atau/or $y = \frac{2}{3}x - 2$

(g) $m = 2$
 $y = 2x + c$
 Pada/ At (1, 4),
 $4 = 2(1) + c$
 $c = 4 - 2$
 $= 2$
 $y = 2x + 2$

(h) $m = \frac{2}{3}$
 $y = \frac{2}{3}x + c$

$$\begin{aligned}
 \text{Pada/ At } (2, 1), \\
 1 &= \frac{2}{3}(2) + c \\
 c &= 1 - \frac{4}{3} \\
 &= -\frac{1}{3} \\
 y &= \frac{2}{3}x - \frac{1}{3}
 \end{aligned}$$

(i) $m_M = \frac{8 - 6}{0 - 4}$ $y = -\frac{1}{2}x + c$
 $= \frac{2}{-4}$ $\text{Pada/ At } (0, 1),$
 $= -\frac{1}{2}$ $1 = -\frac{1}{2}(0) + c$
 $m_N = -\frac{1}{2}$ $c = 1$
 $y = -\frac{1}{2}x + 1$

(j) $3x + y = 2$ $y = -3x + c$
 $y = -3x + 2$ $\text{Pada/ At } (0, 8),$
 $m_B = -3$ $8 = -3(0) + c$
 $m_A = -3$ $c = 8$
 $y = -3x + 8$

(k) $m_C = -\frac{4}{1}$ $y = -4x + c$
 $= -4$ $\text{Pada/ At } (2, 0),$
 $m_D = -4$ $0 = -4(2) + c$
 $c = 8$
 $y = -4x + 8$

$$\begin{aligned} \text{(l)} \quad m_{PQ} &= \frac{8 - (-1)}{4 - (-2)} \\ &= \frac{9}{6} \\ &= \frac{3}{2} \end{aligned}$$

$$\begin{aligned} y &= \frac{3}{2}x + c \\ \text{Pada/ At (6, 6),} \\ 6 &= \frac{3}{2}(6) + c \\ c &= 6 - 9 \\ &= -3 \\ y &= \frac{3}{2}x - 3 \end{aligned}$$

$$\begin{aligned} \text{(m)} \quad y &= \frac{2}{3}x + 3 \\ m &= \frac{2}{3} \end{aligned}$$

$$\begin{aligned} \text{(i)} \quad y &= \frac{2}{3}x + c \\ 1 &= \frac{2}{3}(2) + c \\ c &= -\frac{1}{3} \\ y &= \frac{2}{3}x - \frac{1}{3} \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad y &= \frac{2}{3}x + c \\ 7 &= \frac{2}{3}(3) + c \\ c &= 5 \\ y &= \frac{2}{3}x + 5 \end{aligned}$$

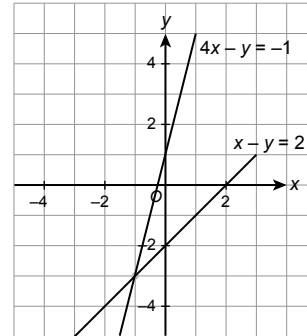
$$\begin{aligned} \text{(iii)} \quad y &= \frac{2}{3}x + c \\ 0 &= \frac{2}{3}(0) + c \\ c &= 0 \\ y &= \frac{2}{3}x \end{aligned}$$

$$\begin{aligned} \text{24. (a)} \quad 4x - y &= -1 \\ y &= 4x + 1 \end{aligned}$$

| | | |
|----------|---|---|
| x | 0 | 1 |
| y | 1 | 5 |

$$\begin{aligned} x - y &= 2 \\ y &= x - 2 \end{aligned}$$

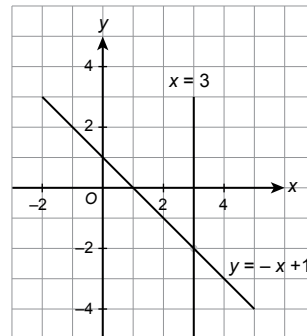
| | | |
|----------|----|----|
| x | 0 | 1 |
| y | -2 | -1 |



Titik persilangan = (-1, -3)
Point of intersection

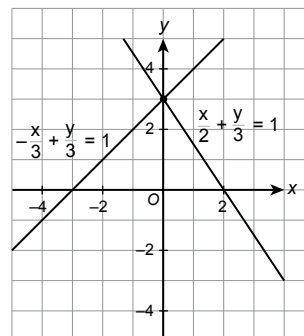
$$\text{(b)} \quad y = -x + 1$$

| | | |
|----------|---|---|
| x | 0 | 1 |
| y | 1 | 0 |



Titik persilangan = (3, -2)
Point of intersection

(c)



Titik persilangan = (0, 3)
Point of intersection

(d) $2x + y = 4, y - x = 1$

$$2x + y = 4$$

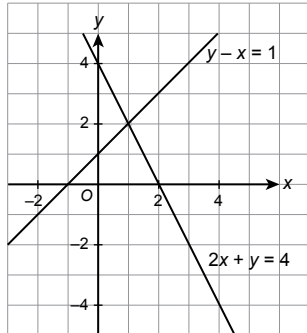
$$y = -2x + 4$$

| | | |
|----------|---|---|
| x | 0 | 1 |
| y | 4 | 2 |

$$y - x = 1$$

$$y = x + 1$$

| | | |
|----------|---|---|
| x | 0 | 3 |
| y | 1 | 4 |



Titik persilangan = (1, 2)
Point of intersection

(e) $x - 6 + 2y = 0, 3x = 2y + 2$

$$x - 6 + 2y = 0$$

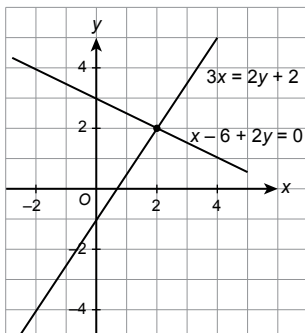
$$y = -\frac{1}{2}x + 3$$

| | | |
|----------|---|---|
| x | 0 | 2 |
| y | 3 | 2 |

$$3x = 2y + 2$$

$$y = \frac{3}{2}x - 1$$

| | | |
|----------|----|---|
| x | 0 | 2 |
| y | -1 | 2 |



Titik persilangan = (2, 2)
Point of intersection

25. (a) $x - 5y + 17 = 0 \dots\dots \textcircled{1}$
 $2x + y = -1 \dots\dots \textcircled{2}$

Daripada/ From $\textcircled{1}$,
 $x = 5y - 17 \dots\dots \textcircled{3}$

Gantikan $\textcircled{3}$ ke dalam $\textcircled{2}$,
Substitute $\textcircled{3}$ into $\textcircled{2}$,
 $2(5y - 17) + y = -1$
 $10y - 34 + y = -1$
 $11y = 33$
 $y = 3$

Gantikan $y = 3$ ke dalam $\textcircled{3}$,
Substitute $y = 3$ into $\textcircled{3}$,
 $x = 5(3) - 17$
 $= 15 - 17$
 $= -2$

Titik persilangan = (-2, 3)
Point of intersection

(b) $5x - 3y - 8 = 0 \dots\dots \textcircled{1}$
 $-3y = -2x + 5 \dots\dots \textcircled{2}$

Daripada/ From $\textcircled{2}$,
 $y = \frac{2}{3}x - \frac{5}{3} \dots\dots \textcircled{3}$

Gantikan $\textcircled{3}$ ke dalam $\textcircled{1}$,
Substitute $\textcircled{3}$ into $\textcircled{1}$,
 $5x - 3(\frac{2}{3}x - \frac{5}{3}) - 8 = 0$
 $5x - 2x + 5 - 8 = 0$
 $3x = 3$
 $x = 1$

Gantikan $x = 1$ ke dalam $\textcircled{3}$,
Substitute $x = 1$ into $\textcircled{3}$,
 $y = \frac{2}{3}(1) - \frac{5}{3}$
 $= -\frac{3}{3}$
 $= -1$

Titik persilangan = (1, -1)
Point of intersection

(c) $4x - 7y = 0 \dots\dots\dots \textcircled{1}$
 $8x - y - 26 = 0 \dots\dots \textcircled{2}$

Daripada/ From $\textcircled{2}$,
 $y = 8x - 26 \dots\dots\dots \textcircled{3}$

Gantikan $\textcircled{3}$ ke dalam $\textcircled{1}$,
 Substitute $\textcircled{3}$ into $\textcircled{1}$,
 $4x - 7(8x - 26) = 0$
 $4x - 56x + 182 = 0$
 $52x = 182$
 $x = \frac{7}{2}$

Gantikan $x = \frac{7}{2}$ ke dalam $\textcircled{3}$,
 Substitute $x = \frac{7}{2}$ into $\textcircled{3}$,
 $y = 8(\frac{7}{2}) - 26$
 $= 28 - 26$
 $= 2$

Titik persilangan = $(\frac{7}{2}, 2)$
 Point of intersection

(d) $\frac{x}{2} + \frac{5y}{6} = 1 \dots\dots \textcircled{1}$
 $5x - y = 10 \dots\dots\dots \textcircled{2}$

$\textcircled{1} \times 6$: $3x + 5y = 6 \dots\dots\dots \textcircled{3}$

Daripada/ From $\textcircled{2}$,
 $y = 5x - 10 \dots\dots\dots \textcircled{4}$

Gantikan $\textcircled{4}$ ke dalam $\textcircled{3}$,
 Substitute $\textcircled{4}$ into $\textcircled{3}$,
 $3x + 5(5x - 10) = 6$
 $3x + 25x - 50 = 6$
 $28x = 56$
 $x = 2$

Gantikan $x = 2$ ke dalam $\textcircled{4}$,
 Substitute $x = 2$ into $\textcircled{4}$,
 $y = 5(2) - 10$
 $= 10 - 10$
 $= 0$

Titik persilangan = $(2, 0)$
 Point of intersection

(e) $y = -\frac{1}{3}x + \frac{7}{3} \dots\dots \textcircled{1}$

$y = x + 3 \dots\dots\dots \textcircled{2}$

$\textcircled{1} \times 3$: $3y = -x + 7 \dots\dots \textcircled{3}$

Gantikan $\textcircled{2}$ ke dalam $\textcircled{3}$,

Substitute $\textcircled{2}$ into $\textcircled{3}$,

$3(x + 3) = -x + 7$

$3x + 9 = -x + 7$

$4x = -2$

$x = -\frac{1}{2}$

Gantikan $x = -\frac{1}{2}$ ke dalam $\textcircled{2}$,

Substitute $x = -\frac{1}{2}$ into $\textcircled{2}$,

$y = -\frac{1}{2} + 3$

$= \frac{5}{2}$

Titik persilangan = $(-\frac{1}{2}, \frac{5}{2})$
 Point of intersection

26. (a) $7x - 4y = -7 \dots\dots\dots \textcircled{1}$

$5x + y = 22 \dots\dots\dots \textcircled{2}$

$\textcircled{2} \times 4$:

$20x + 4y = 88 \dots\dots \textcircled{3}$

$\textcircled{1} + \textcircled{3}$:

$27x = 81$

$x = 3$

Gantikan $x = 3$ ke dalam $\textcircled{1}$,

Substitute $x = 3$ into $\textcircled{1}$,

$7(3) - 4y = -7$

$4y = 21 + 7$

$4y = 28$

$y = 7$

Titik persilangan = $(3, 7)$
 Point of intersection

(b) $x - 2y = 15 \dots\dots\dots \textcircled{1}$

$3y = -2x + 2 \dots\dots\dots \textcircled{2}$

$\textcircled{1} \times 2$:

$2x - 4y = 30 \dots\dots\dots \textcircled{3}$

Daripada/ From $\textcircled{2}$,

$2x + 3y = 2 \dots\dots \textcircled{4}$

$\textcircled{4} - \textcircled{3}$:

$7y = -28$

$y = -4$

Gantikan $y = -4$ ke dalam $\textcircled{1}$,

Substitute $y = -4$ into $\textcircled{1}$,

$x - 2(-4) = 15$

$x + 8 = 15$

$x = 7$

Titik persilangan = $(7, -4)$
 Point of intersection

(c) $x - 3y + 12 = 0 \dots\dots \textcircled{1}$
 $2x + 4y = -4 \dots\dots \textcircled{2}$

$\textcircled{1} \times 2:$
 $2x - 6y + 24 = 0$
 $2x - 6y = -24 \dots\dots \textcircled{3}$

$\textcircled{2} - \textcircled{3}:$
 $10y = 20$
 $y = 2$

Gantikan $y = 2$ ke dalam $\textcircled{2}$,
 Substitute $y = 2$ into $\textcircled{2}$,

$2x + 4(2) = -4$
 $2x = -4 - 8$
 $2x = -12$
 $x = -6$

Titik persilangan = $(-6, 2)$
 Point of intersection

(d) $y = \frac{1}{5}x - \frac{16}{5} \dots\dots \textcircled{1}$
 $-3x + 7y = -8 \dots\dots \textcircled{2}$

$\textcircled{1} \times 5:$
 $5y = x - 16$
 $x - 5y = 16 \dots\dots \textcircled{3}$

$\textcircled{3} \times 3:$
 $3x - 15y = 48 \dots\dots \textcircled{4}$

$\textcircled{2} + \textcircled{4}:$
 $-8y = 40$
 $y = -5$

Gantikan $y = -5$ ke dalam $\textcircled{3}$,
 Substitute $y = -5$ into $\textcircled{3}$,

$x - 5(-5) = 16$
 $x + 25 = 16$
 $x = -9$

Titik persilangan = $(-9, -5)$
 Point of intersection

(e) $y = -\frac{1}{3}x + \frac{8}{3} \dots\dots \textcircled{1}$
 $2x - 3y = 2 \dots\dots \textcircled{2}$

$\textcircled{1} \times 3:$
 $3y = -x + 8$
 $x + 3y = 8 \dots\dots \textcircled{3}$

$\textcircled{3} + \textcircled{2}:$
 $3x = 10$
 $x = \frac{10}{3}$

Gantikan $x = \frac{10}{3}$ ke dalam $\textcircled{2}$,

Substitute $x = \frac{10}{3}$ into $\textcircled{2}$,

$2\left(\frac{10}{3}\right) - 3y = 2$
 $3y = \frac{20}{3} - 2$
 $3y = \frac{14}{3}$
 $y = \frac{14}{9}$

Titik persilangan = $\left(\frac{10}{3}, \frac{14}{9}\right)$
 Point of intersection

27. (a) $5x + 7y - 35 = 0$

$5x + 7y = 35$

$\frac{5x}{35} + \frac{7y}{35} = \frac{35}{35}$

$\frac{x}{7} + \frac{y}{5} = 1$

pintasan-x/ x-intercept = 7,

pintasan-y/ y-intercept = 5

Luas kawasan AOB = $\frac{1}{2} \times 7 \times 5$
 The area of the region AOB = 17.5 unit^2

(b) (i) 25 cm

(ii) $x = 4, y = \frac{1}{2}(4) + 25$
 $= 2 + 25$
 $= 27$

Ketinggian selepas 4 minggu ialah 27 cm.
 The height after 4 weeks is 27 cm.

(iii) $y = 45, \frac{1}{2}x + 25 = 45$
 $\frac{1}{2}x = 20$
 $x = 40$

Bilangan minggu yang diperlukan ialah 40 minggu.
 The number of weeks needed is 40 weeks.

(c) (i) Katakan $y =$ kos bayaran dan $x =$ masa menyewa bot, maka

Let $y =$ cost and $x =$ time of renting a boat, then

Pilihan A/ Option A: $y = 4x + 10$

Pilihan B/ Option B: $y = 2x + 15$

(ii) $4x + 10 = 2x + 15$

$$4x - 2x = 15 - 10$$

$$2x = 5$$

$$x = 2.5$$

Pada 2.5 jam, kos bayaran kedua-dua pilihan itu adalah sama.

At 2.5 hours, the two options cost the same amount.

(iii) Pilihan A/ Option A:

$$y = 4(2) + 10$$

$$= 8 + 10$$

$$= 18$$

Pilihan B/ Option B:

$$y = 2(2) + 15$$

$$= 4 + 15$$

$$= 19$$

Pilihan A lebih baik jika Halim ingin menyewa 2 jam kerana lebih murah.

Option A is better if Halim wants to rent for 2 hours because it is cheaper.

(d) Jalan A/ Road A: $y = -x + 3$ ①

Jalan B/ Road B: $2y = 3x + 1$ ②

Gantikan ① ke dalam ②,

Substitute ① into ②,

$$2(-x + 3) = 3x + 1$$

$$-2x + 6 = 3x + 1$$

$$-2x - 3x = 1 - 6$$

$$-5x = -5$$

$$x = 1$$

Gantikan $x = 1$ ke dalam ①,

Substitute $x = 1$ into ①,

$$y = -1 + 3$$

$$= 2$$

Koordinat titik pada kolam air pancut = (1, 2)

The coordinates of point at the fountain

Power PT3

Bahagian **A**

1. $4y + x = 16$

$$4y = -x + 16$$

$$y = -\frac{1}{4}x + 4$$

$$\text{Kecerunan/ Gradient} = -\frac{1}{4}$$

Jawapan/ Answer: **B**

2. $y = -2x + 4$

$$2x + y = 4$$

$$\frac{2x}{4} + \frac{y}{4} = \frac{4}{4}$$

$$\frac{x}{2} + \frac{y}{4} = 1$$

Jawapan/ Answer: **A**

3. $2x - y = 6$

Pada/ At (0, -6),

sebelah kiri/ left hand side: $2(0) - (-6) = 6$

sebelah kanan/ right hand side: 6

Maka, (0, -6) terletak pada garis lurus $2x - y = 6$.

Hence, (0, -6) is on the straight line $2x - y = 6$.

Pada/ At (3, 0),

sebelah kiri/ left hand side: $2(3) - (0) = 6$

sebelah kanan/ right hand side: 6

Maka, (3, 0) terletak pada garis lurus $2x - y = 6$.

Hence, (3, 0) is on the straight line $2x - y = 6$.

Jawapan/ Answer: **D**

4. $-\frac{x}{3} + \frac{y}{5} = 1$

$$-5x + 3y = 15$$

$$3y = 5x + 15$$

$$y = \frac{5}{3}x + 5$$

Jawapan/ Answer: **C**

5. Persamaan garis lurus A: $y = -2x + 7$

Equation of straight line A

Kecerunan/ Gradient = -2

A $2x + 2y = 6$

$$2y = -2x + 6$$

$$y = -x + 3 \text{ (Kecerunan/ Gradient} = -1)$$

B $x - y = 3$

$$y = x - 3 \text{ (Kecerunan/ Gradient} = 1)$$

C $-x + 2y = 2$

$$2y = x + 2$$

$$y = \frac{1}{2}x + 1 \text{ (Kecerunan/ Gradient} = \frac{1}{2})$$

D $-4x - 2y = 6$

$$2y = -4x - 6$$

$$y = -2x - 3 \text{ (Kecerunan/ Gradient} = -2)$$

Persamaan yang mungkin bagi garis lurus B ialah

The possible equation of the straight line B is

$$-4x - 2y = 6$$

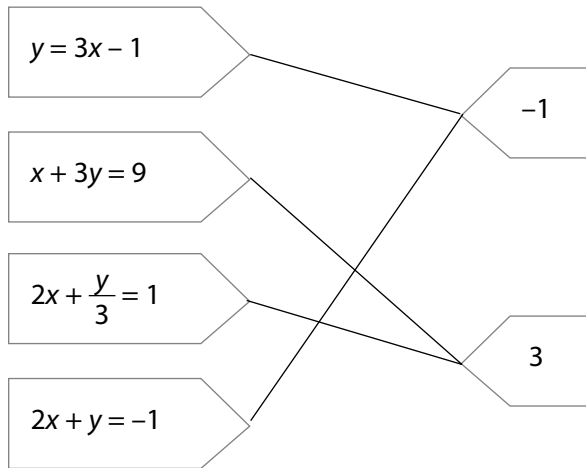
Jawapan/ Answer: **D**

6. A $y + x + 1 = 0$
 $y = -x - 1$ (pintasan-y/ y-intercept = -1)
- B $2y = x + 1$
 $y = \frac{1}{2}x + \frac{1}{2}$ ((pintasan-y/ y-intercept = $\frac{1}{2}$))
- C $x - y = 5$
 $y = x - 5$ (pintasan-y/ y-intercept = -5)
- D $3y + x - 3 = 0$
 $3y = -x + 3$
 $y = -\frac{1}{3}x + 1$ (pintasan-y/ y-intercept = 1)

Jawapan / Answer: **D**

Bahagian B

7.



8.

| Persamaan garis lurus Equation of straight line | Kecerunan Gradient |
|--|-----------------------|
| $2y = x - 1$ | $\frac{1}{2}$ |
| $-\frac{x}{5} + \frac{y}{4} = 1$ | $\frac{4}{5}$ |
| $2x + 1 = y$ | 2 |
| $14x + 7y = 21$ | -2 |

Bahagian C

9. (a) (i) Darpada $y = 2x + 3$, kecerunan = 2
 From $y = 2x + 3$, gradient = 2
- (ii) Kecerunan garis lurus l
 Gradient of straight line l
 $= -\frac{1}{2}$

Garis lurus l dan ll tidak selari. Kecerunan kedua-dua garis lurus itu tidak sama, $2 \neq -\frac{1}{2}$.

Straight lines l and ll are not parallel. The gradients of both the straight lines are not equal, $2 \neq -\frac{1}{2}$.

(b) (i) $m_{SR} = m_{PQ} = \frac{7-5}{1-9}$
 $= \frac{2}{-8}$
 $= -\frac{1}{4}$

$y = -\frac{1}{4}x + c$

Pada/ At (-7, -1),

$-1 = -\frac{1}{4}(-7) + c$

$c = -1 - \frac{7}{4}$
 $= -\frac{11}{4}$

Persamaan SR/ Equation of SR:

$y = -\frac{1}{4}x - \frac{11}{4}$

- (ii) R ialah titik persilangan SR dan QR.
 R is an intersection point of SR and QR.

Persamaan QR/ Equation of QR:

$x = 9$ ← QR selari dengan garis mencancang TU, $x = 6$
QR is parallel to vertical line TU, $x = 6$

Gantikan $x = 9$ ke dalam $y = -\frac{1}{4}x - \frac{11}{4}$,

Substitute $x = 9$ into $y = -\frac{1}{4}x - \frac{11}{4}$,

$y = -\frac{1}{4}(9) - \frac{11}{4}$
 $= -\frac{9}{4} - \frac{11}{4}$
 $= -5$

Koordinat titik R = (9, -5)

Coordinates of point R

- (c) (i) 40%

- (ii) $c = 40$

$y = mx + 40$

Titik (20, 80) daripada graf,
 Point (20, 80) from the graph,

$80 = m(20) + 40$

$20m = 40$

$m = 2$

Persamaan garis lurus itu ialah

The equation of the straight line is

$$y = 2x + 40.$$

10. (a) (i) **Sebelah kiri:** $y = 7$
Left hand side:
Sebelah kanan: $-5x + 2 = -5(-1) + 2 = 7$
Right hand side:

$$7 = 7$$

∴ Titik Q terletak pada garis lurus.
Point Q is on the straight line.

(ii) $y = mx + c$
 $y = \frac{5-1}{-2-0}x + 1$
 $y = -2x + 1$

(b) $2y = -x + 2$
 $y = -\frac{1}{2}x + 1$

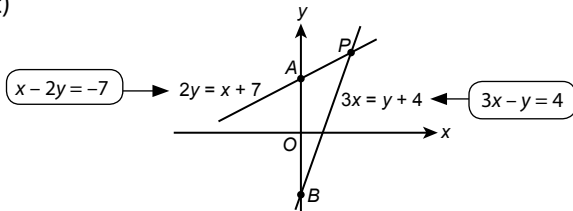
Kecerunan garis yang melalui A = $-\frac{1}{2}$
Gradient of line through A

$$y = -\frac{1}{2}x + c$$

Pada/ At A(2, 5), $5 = -\frac{1}{2}(2) + c$
 $c = 6$

Persamaan/ Equation : $y = -\frac{1}{2}x + 6$

(c)



$$3x - y = 4 \dots\dots \textcircled{1}$$

$$x - 2y = -7 \dots\dots \textcircled{2}$$

$$\textcircled{2} \times 3, 3x - 6y = -21 \dots\dots \textcircled{3}$$

$$\textcircled{1} - \textcircled{3}, 5y = 25$$

$$y = 5$$

Gantikan $y = 5$ ke dalam $\textcircled{1}$,

Substitute $y = 5$ into $\textcircled{1}$,

$$3x - 5 = 4$$

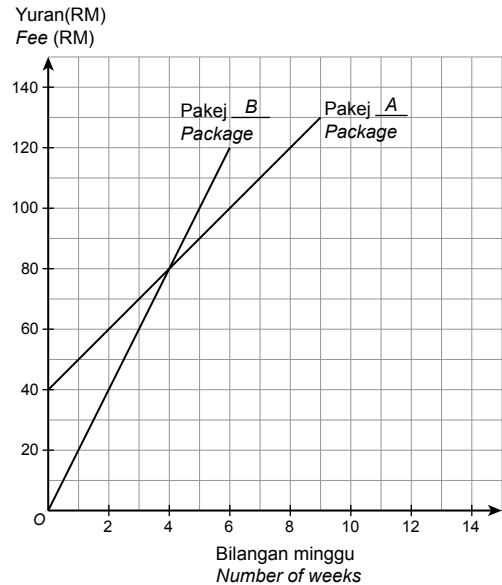
$$x = 3$$

∴ Titik persilangan ialah P(3, 5).

The point of intersection is P(3, 5).

Power KBAT

1. (a)



(b) Minggu ke-4, iaitu RM80.
4th week, that is RM80.

(c) Yuran pakej A/ Fee of package A = $40 + 10(10)$
 $= 40 + 100$
 $= \text{RM}140$

Yuran pakej B/ Fee of package B = $20(10)$
 $= \text{RM}200$

Beza bayaran/ Difference of payment
 $= 200 - 140$
 $= \text{RM}60$

JAWAPAN

Kertas Model PT3

Bahagian A

1. $64^{\frac{3}{4}} = (2^6)^{\frac{3}{4}}$
 $= 2^{\frac{9}{2}}$

$m = 2, n = 9$

Jawapan / Answer: **B**

2. $(q^5)^2 = q^{5 \times 2}$
 $= q^{10}$

Jawapan / Answer: **D**

3. $74\,008 = 7.4008 \times 10\,000$
 $= 7.4008 \times 10^4$

Jawapan / Answer: **B**

4. $K - 2J = -14 - 2(27)$
 $= -14 - 54$
 $= 68$

Jawapan / Answer: **A**

5. Nilai eksa ialah 1×10^{18} .
The value of exa is 1×10^{18} .

Jawapan / Answer: **D**

6. Saham tidak sesuai sekiranya Jebat tidak berminat dalam pelaburan berisiko tinggi.

Shares are not suitable if Jebat is not interested in high risk investment.

Jawapan / Answer: **D**

7. $1\,250 + 1\,250 \times r \times 1 = 1\,287.50$
 $1\,250r = 37.5$
 $r = 0.03$
 $= 3\%$

Jawapan / Answer: **B**

8. Jarak sebenar/ *Actual distance* = 92 km

Jarak di atas peta
 $\frac{\text{Distance on map}}{92 \text{ km}} = \frac{1 \text{ cm}}{10 \text{ km}}$

Jarak di atas peta/ *Distance on map*

$= \frac{1}{10} \times 92$

$= 9.2 \text{ cm}$

Jawapan / Answer: **C**

9. $1 \text{ cm} : 0.01 \text{ m}$
 $= 1 \text{ cm} : 1 \text{ cm}$
 $= 1 : 1$

Jawapan / Answer: **A**

10. $PR = \sqrt{8^2 + 15^2}$
 > 17

Jawapan / Answer: **D**

11. $\tan \theta - \sin \theta = \frac{8}{15} - \frac{8}{17}$
 $= \frac{136}{255} - \frac{120}{255}$
 $= \frac{16}{255}$

Jawapan / Answer: **B**

12. $105^\circ + 5x = 180^\circ$
 $5x = 75^\circ$
 $x = 15^\circ$

$72^\circ + 2y = 180^\circ$

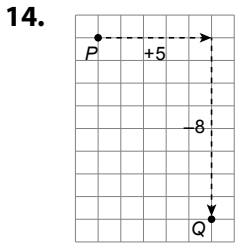
$2y = 108^\circ$

$y = 54^\circ$

$x + y = 15^\circ + 54^\circ$
 $= 69^\circ$

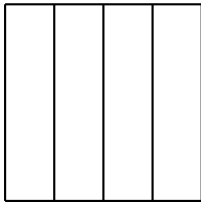
Jawapan / Answer: **C**

13. $(n - 2) \times 180^\circ = 1\,260^\circ$
 $n - 2 = 7$
 $n = 9$
 \therefore Nonagon/ Nonagon
 Jawapan / Answer: **D**



Jawapan / Answer: **C**

15. Pelan pepejal:
 Plan of the solid:



Jawapan / Answer: **C**

16. Locus bagi titik *J* adalah berjarak sama dari dua garis yang bersilang.
 Locus of point *J* is equidistant from two intersecting lines.
 Jawapan / Answer: **C**

17. Koordinat *H* ialah (0, 3). Maka, **A** tidak benar.
 Coordinates of *H* is (0, 3). Hence, **A** is not true.
 Jawapan / Answer: **A**

18. $2x - 3y = 6$
 $3y = 2x - 6$
 $y = \frac{2}{3}x - 2$
 Kecerunan / Gradient = $\frac{2}{3}$
 Jawapan / Answer: **B**

19.

| Garis Line | Kecerunan Gradient |
|------------|--|
| PQ | $\frac{10 - 2}{-3 + 7} = 2$ |
| RS | $\frac{5 - 1}{-2 + 5} = \frac{4}{3}$ |
| TU | $\frac{14 - 4}{5 - 1} = 2.5$ (Paling curam / steepest) |
| VW | $\frac{8 - 3}{8 - 4} = 1.25$ |

Jawapan / Answer: **C**

20. **B** adalah benar. Locus bagi titik *B* sentiasa berjarak 4 unit dari garis *JM*.
B is true. Locus of point *B* is always 4 units from line *JM*.
 Jawapan / Answer: **B**

Bahagian B

21. (a) $X = 59, Y = 52$
 (b) Faktor bagi 28 / Factor of 28:
 1, 2, 4, 7, 14, 28
 $P = 2, Q = 14$
22. (a) $0.00025 - 1.3 \times 10^{-4}$
 $= 2.5 \times 10^{-4} - 1.3 \times 10^{-4}$
 $= (2.5 - 1.3) \times 10^{-4}$
 $= 1.2 \times 10^{-4}$
 (b) $\sqrt[3]{2000} = 12.60$
 Dua kuasa tiga sempurna terkecil selepas 2 000
 Two smallest perfect cubes after 2 000
 $= 13^3, 14^3$
 $= 2\,197, 2\,744$

23. (a)

| | |
|---|----|
| Hipotenus Hypotenuse | PR |
| Sisi yang bertentangan dengan $\angle QPR$. The side that is opposite to $\angle QPR$. | QR |

- (b) *a*: Sektor minor
 Minor sector
b: Jejari
 Radius

24. (a)

| Nama poligon <i>Name of polygon</i> | Bilangan bucu <i>Number of vertices</i> | Bilangan pepenjuru <i>Number of diagonals</i> |
|--|--|--|
| Heptagon | 7 | 14 |
| Heksagon <i>Hexagon</i> | 6 | 9 |

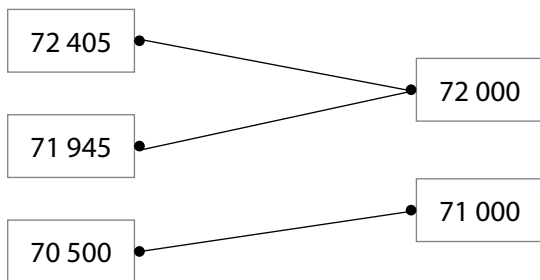
(b) (i) Sudut p dan q ialah sudut selang-seli.

Angles p and q are alternate angles.

(ii) Sudut s dan t ialah sudut bertentangan.

Angles s and t are opposite angles.

25. (a)



(b) (ii) (✓)

Bahagian C

26. (a) (i) $(a^2)^{-3} = a^2 - (-3)$
 $= a^{-6}$

(ii) $p^2 \div p^{-3} = p^{2 - (-3)}$
 $= p^5$

(iii) $3u^2 \times (2uv^2)^2$
 $= 3u^2 \times 2^2 u^2 v^4$
 $= 3 \times 2^2 \times u^2 \times u^2 \times v^4$
 $= 12u^4 v^4$

(b) Masa / Time

$= 1 \text{ jam } 40 \text{ minit } (1 \text{ hour } 40 \text{ minutes})$

$= 1 \frac{40}{60} \text{ j } (1 \frac{40}{60} \text{ h})$

$= 1 \frac{2}{3} \text{ j } (1 \frac{2}{3} \text{ h})$

Laju / Speed

$= \frac{160}{1 \frac{2}{3}}$

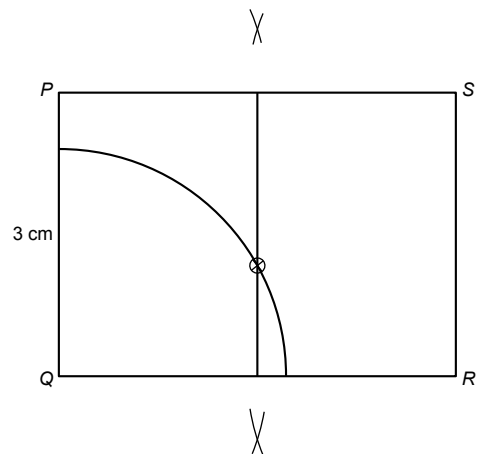
$= 96 \text{ km/j } (96 \text{ km/h})$

Pecutan / Acceleration

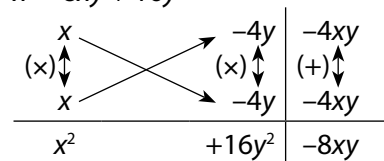
$= \frac{105 - 96}{0.5}$

$= 18 \text{ km/j}^2 (18 \text{ km/h}^2)$

(c)



27. (a) $x^2 - 8xy + 16y^2$



$x^2 - 8xy + 16y^2 = (x - 4y)(x - 4y)$

Panjang kertas / Length of paper (cm)
 $= x - 4y$

(b) (i) $3x + 2.5y$

(ii) $3(2) + 2.5(6) + 2(5) = 31$

Tidak boleh. Ini kerana jumlah pembelian melebihi wangnya.

No. Because the total purchase is more than his money.

- (c) (i) 30, 32, 32, 33, 33, 33, 33, 34,
34, 34, 36, (36), (36), 36, 37, 37,
37, 37, 37, 38, 38, 38, 40, 42

Mod / Mode = 37,
median = 36

37 mempunyai kekerapan tertinggi, iaitu 5.
37 has the highest frequency, which is 5.

(ii) Saiz 37. Sebab saiz kasut ini mempunyai permintaan yang paling tinggi.

Size 37. Because this size has the highest demand.

28. (a)

| | | |
|-------|-------------------------------|-----------------------|
| (i) | $\tan \theta = \frac{4}{3}$ | $\theta = \angle PRQ$ |
| (ii) | $\sin \alpha = \frac{12}{13}$ | $\alpha = \angle RPS$ |
| (iii) | $\cos \beta = \frac{4}{5}$ | $\beta = \angle QPR$ |

(b) (i) $4.5x + 3(2y) = 18$
 $4.5x + 6y = 18$

(ii) $4.5x + 6(1.5) = 18$
 $4.5x = 9$
 $x = 2$
 Jisim betik ialah 2 kg.
The mass of papaya is 2 kg.

(c) Isi padu ruang kosong dalam bekas
Volume of the empty space in the container

$$= (100\% - 80\%) \times \frac{22}{7} \times \left(\frac{28}{2}\right)^2 \times 25$$

$$= 0.2 \times \frac{22}{7} \times 14^2 \times 25$$

$$= 3\,080 \text{ cm}^3$$

$$= 3.08 \times 10^3 \text{ cm}^3$$

29. (a) Jumlah bayaran balik
Total repayment

$$= 24\,000 + (24\,000 \times 0.06 \times 5)$$

$$= \text{RM}31\,200$$

Bayaran ansuran bulanan
Monthly instalment

$$= \frac{31\,200}{5 \times 12}$$

$$= \text{RM}520$$

(b) (i) P(bola kuning)
P(a yellow ball)

$$= 1 - \frac{1}{4} - \frac{10}{32}$$

$$= \frac{7}{16}$$

(ii) Bilangan bola hijau
Number of green balls

$$= \frac{1}{4} \times 32$$

$$= 8$$

P(bola hijau)
P(a green ball)

$$= \frac{8}{32 - 4}$$

$$= \frac{8}{28}$$

$$= \frac{2}{7}$$

(c) $4x - 3 \leq 7 + 6x$, $2x + 4 > 3x$
 $4x - 6x \leq 7 + 3$ $4 > 3x - 2x$
 $-2x \leq 10$ $4 > x$
 $x \geq -5$ $x < 4$

Berdasarkan garis nombor,
Based on the number line,
 $x \geq m, x < n$
 $m = -5, n = 4$

30. (a) (i) $0.06 : 0.15 : 2.1 = 2 : 5 : \underline{\quad 70 \quad}$

(ii) $\frac{1}{5} : \frac{3}{4} = 4 : \underline{\quad 15 \quad}$

(iii) $1\frac{1}{4} : 8 = \underline{\quad 5 \quad} : 32$

(i) $0.06 : 0.15 : 2.1$
 $= 6 : 15 : 210$
 $\downarrow \div 3 \quad \downarrow \div 3 \quad \downarrow \div 3$
 $= 2 : 5 : 70$

(ii) $\frac{1}{5} : \frac{3}{4} = \frac{1}{5} \times 20 : \frac{3}{4} \times 20$
 $= 4 : 15$

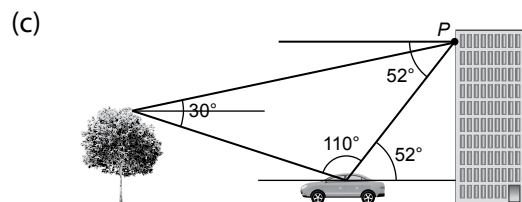
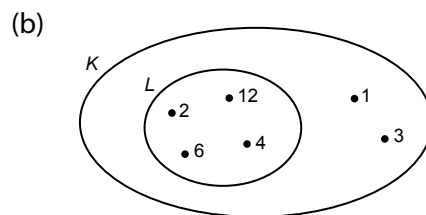
(iii) $1\frac{1}{4} : 8 = \frac{5}{4} : 8$
 $= \frac{5}{4} \times 4 : 8 \times 4$
 $= 5 : 32$

atau / or

$$1\frac{1}{4} : 8 = 1.25 : 8$$

$$= 125 : 800$$

$$= 5 : 32$$



(i) Sudut dongak puncak pokok dari kereta
Angle of elevation of top of tree from car

$$= 180^\circ - 110^\circ - 52^\circ$$

$$= 18^\circ$$

- (ii) Sudut tumpul puncak pokok dari titik P
Angle of depression of top of tree from point P
 $= 30^\circ - 18^\circ$
 $= 12^\circ$

31. (a) (i) darab dengan (-1)
multiply by (-1)

(ii) $k = -3$

(iii) Hubungan satu kepada satu
One-to-one relation

(b) (i) $y = -1$

(ii) Kecerunan PQ
Gradient of PQ
 $= \frac{2 - (-1)}{0 - (-2)}$
 $= \frac{3}{2}$

Persamaan PQ
Equation of PQ

$$y = \frac{3}{2}x + 2$$

(c) (i)

