

$$1.1. \quad \begin{array}{ccc} 27 & 35 & 64 \\ \sqrt[3]{27} & \sqrt[3]{35} & \sqrt[3]{64} \\ 3 & \sqrt[3]{35} & 4 \end{array} \quad \checkmark$$

$\therefore$  3 and 4  $\checkmark$  2

$$1.2. \quad \begin{array}{l} 100x = 218,1818 \dots \\ x = 2,1818 \dots \end{array}$$

$$99x = 216 \quad \checkmark$$

$$x = \frac{216}{99} \quad \checkmark$$

$$= \frac{24}{11} \quad \checkmark$$

4

$$1.3. \quad P = \frac{\sqrt{4x-7}}{3x+2}$$

$$1.3.1. \quad \text{den} = 0$$

$$3x+2 = 0$$

$$x = -\frac{2}{3} \quad \checkmark$$

1

$$1.3.2. \quad 4x-7 < 0$$

$$x < \frac{7}{4}$$

$$x = 1; 0; \text{etc} \quad \checkmark$$

1

$$1.3.3. \quad \text{num} = 0$$

$$\sqrt{4x-7} = 0$$

$$()^2: \quad 4x-7 = 0$$

$$x = \frac{7}{4} \quad \checkmark$$

1

$$2.1. \quad \begin{array}{l} 1. \quad x - (2x-1)x - 1 \\ = x - (2x^2 - x) - 1 \\ = x - 2x^2 + x - 1 \quad \checkmark \\ = -2x^2 + 2x - 1 \quad \checkmark \end{array} \quad 2$$

$$2.1. \quad \begin{array}{l} 2. \quad (3p-2q)(9p^2+6pq+4q^2) \\ = 27p^3 - 8q^3 \quad \checkmark \end{array} \quad 2$$

$$2.1. \quad \begin{array}{l} 3. \quad 3x^{\frac{1}{3}}(2x^{\frac{1}{2}} - 5x^{\frac{1}{3}}) \\ = 3x^{\frac{1}{3}} \cdot 2x^{\frac{1}{2}} - 3x^{\frac{1}{3}} \cdot 5x^{\frac{1}{3}} \\ = 6x^{\frac{5}{6}} - 15x^{\frac{2}{3}} \quad \checkmark \end{array} \quad 2$$

$$2.2. \quad \begin{array}{l} \left(a - \frac{4}{a}\right)^2 = (3)^2 \\ \checkmark a^2 - 8 + \frac{16}{a^2} = 9 \\ a^2 + \frac{16}{a^2} = 17 \quad \checkmark \end{array} \quad 2$$

$$\begin{aligned}
 3.1. \quad & \overbrace{ax - bx} - \overbrace{ay + by} \\
 & = x(a-b) - y(a-b) \\
 & = \frac{(a-b)(x-y)}{\checkmark \quad \checkmark} \rightarrow 2
 \end{aligned}$$

$$\begin{aligned}
 3.2. \quad & 16x^3 + \frac{y^3}{4} \\
 & = \frac{64x^3 + y^3}{4} \\
 & = \frac{(4x+y)(16x^2 - 4xy + y^2)}{4 \checkmark} \rightarrow 3
 \end{aligned}$$

$$\begin{aligned}
 3.3. \quad & 6 \cdot 5^{2x} - 5^x - 12 \\
 & \quad k = 5^x \\
 & \quad (k)^2 = (5^x)^2 \\
 & \quad = 5^{2x} \\
 & 6k^2 - k - 12 \\
 & = (2k-3)(3k+4) \\
 & = \frac{(2 \cdot 5^x - 3)(3 \cdot 5^x + 4)}{\checkmark \quad \checkmark} \rightarrow 2
 \end{aligned}$$

$$\begin{aligned}
 3.4. \quad & 6x^2 - 5xy + y^2 \\
 & = \frac{(2x - y)(3x - y)}{\checkmark \quad \checkmark} \rightarrow 2
 \end{aligned}$$

$$\begin{aligned}
 4.1. \quad & 12 = 2^2 \cdot 3 \\
 & \frac{1}{4} = \frac{1}{2^2} = 2^{-2} \\
 & 9 = 3^2 \\
 & 27 = 3^3 \\
 & 8 = 2^3 \\
 & \frac{12^x \left(\frac{1}{4}\right)^{x-1}}{9^{-x-1} \cdot 27^x \cdot 8} \\
 & = \frac{(2^2 \cdot 3)^x (2^{-2})^{x-1}}{(3^2)^{-x-1} (3^3)^x \cdot 2^3} \checkmark \\
 & = \frac{2^{2x} \cdot 3^x \cdot 2^{-2x} \cdot 2^2}{3^{-2x-2} \cdot 3^{3x} \cdot 2^3} \checkmark \\
 & = \frac{2^{2x-2x+2} \cdot 3^x}{3^{-2x-2+3x} \cdot 2^3} \\
 & = \frac{2^2 \cdot 3^x}{3^{x-2} \cdot 2^3} \\
 & = 2^{2-3} \cdot 3^{x-(x-2)} \\
 & = 2^{-1} \cdot 3^{x-x+2} \\
 & = 2^{-1} \cdot 3^2 \checkmark \\
 & = \frac{1}{2} \cdot 9 \\
 & = \frac{9}{2} \checkmark \rightarrow 4
 \end{aligned}$$

$$4.2. \quad \frac{\frac{1}{x} - \frac{1}{y}}{\frac{x}{5} - 1}$$

$$= \frac{\frac{y-x}{xy}}{\frac{x-y}{y}}$$

$$= \frac{y-x}{xy} \times \frac{y}{x-y}$$

$$= \frac{-(x-y)}{x} \times \frac{1}{x-y}$$

$$= -\frac{1}{x}$$

$$5.1. \quad x^2 - 6x = 0$$

$$x(x-6) = 0 \quad \checkmark$$

$$x=0 \text{ or } 6 \quad \checkmark \quad 2$$

$$5.2. \quad \frac{x+1}{x-2} = \frac{x-2}{x+1}$$

$$\text{LCD} = (x-2)(x+1)$$

$$(\because x+2 \text{ and } -1)$$

x thru

$$(x+1)(x+1) = (x-2)(x-2)$$

$$x^2 + 2x + 1 = x^2 - 4x + 4$$

$$6x = 3$$

$$x = \frac{1}{2} \quad \checkmark \quad 3$$

$$5.3. \quad 4x^2 = 2(5x+3)$$

$$= 10x + 6$$

$$4x^2 - 10x - 6 = 0$$

$$\div 2: \quad 2x^2 - 5x - 3 = 0 \quad \checkmark$$

$$(x+3)(2x+1) = 0 \quad \checkmark$$

$$\therefore x = -3 \text{ or } -\frac{1}{2} \quad \checkmark \quad 3$$

$$5.4. \quad 3^{x-1} + 3^{x+1} = 30$$

$$3^x \cdot 3^{-1} + 3^x \cdot 3^1 = 30$$

$$3^x \left( \frac{1}{3} + 3 \right) = 30$$

$$3^x \left( \frac{1+9}{3} \right) = 30$$

$$\checkmark 3^x \cdot \frac{10}{3} = 30$$

$$3^x = \frac{30}{10/3}$$



$$\begin{aligned}
 3^x &= 3^6 \times \frac{3}{10} \\
 &= 9 \checkmark \\
 &= 3^2 \\
 \therefore x &= 2 \checkmark
 \end{aligned}$$

4

5.5.

$$\begin{aligned}
 3x^{\frac{3}{7}} + 5 &= 0 \\
 x^{\frac{3}{7}} &= -\frac{5}{3} \checkmark \\
 \left(x^{\frac{3}{7}}\right)^{\frac{7}{3}} &= \left(-\frac{5}{3}\right)^{\frac{7}{3}} \checkmark \\
 x &= -3,29 \checkmark
 \end{aligned}$$

3

5.6.

$$\begin{aligned}
 3 \cdot 2^{x+3} &= \frac{1}{7} \\
 2^{x+3} &= \frac{1}{21} \checkmark \\
 x+3 &= \frac{\log \frac{1}{21}}{\log 2} \checkmark \\
 &= -4,39\dots \\
 x &= -7,39 \checkmark
 \end{aligned}$$

3

5.7.

$$\begin{aligned}
 x^{\frac{2}{3}} - 2x^{\frac{1}{3}} - 8 &= 0 \\
 k &= x^{\frac{1}{3}} \\
 (k)^2 &= (x^{\frac{1}{3}})^2 \\
 &= x^{\frac{2}{3}} \\
 k^2 - 2k - 8 &= 0 \\
 (k+2)(k-4) &= 0 \checkmark \\
 \therefore k &= -2 \text{ or } 4 \\
 x^{\frac{1}{3}} &= -2 \checkmark \quad x^{\frac{1}{3}} = 4 \\
 (x^{\frac{1}{3}})^3 &= (-2)^3 \quad (x^{\frac{1}{3}})^3 = (4)^3 \\
 x &= -8 \checkmark \quad x = 64 \checkmark
 \end{aligned}$$

3

6.1. 1.

$$\begin{aligned}
 -3 < 15 - 3x &\leq 6 \\
 -15: -18 < -3x &\leq -9 \checkmark \\
 \div -3: 6 > x &\geq 3 \checkmark
 \end{aligned}$$

2

6.1. 2

$$\begin{array}{c}
 3 \quad \quad \quad 6 \\
 \bullet \text{-----} \bullet \checkmark
 \end{array}$$

1

6.1. 3.

$$\begin{array}{c}
 x \in [3; 6) \checkmark \\
 \text{-----} \triangleright
 \end{array}$$

1

6.2.

$$\begin{aligned}
 2x &= 3y + 5 \quad \dots 1 \\
 3x + 6y &= 11 \quad \dots 2
 \end{aligned}$$

(1)  $2x - 3y = 5$

(1)  $\times 2$ :  $4x - 6y = 10 \checkmark$

(2)  $3x + 6y = 11$

---


$$\begin{array}{r}
 7x \qquad \qquad = 21 \\
 x = 3 \checkmark
 \end{array}$$

(2)  $3(3) + 6y = 11$

$$\begin{aligned}
 6y &= 2 \\
 y &= \frac{1}{3} \checkmark
 \end{aligned}$$

$\therefore x = 3$  and  $y = \frac{1}{3}$

3

7.1.  $7; 15; 23; \dots; 1255$   
 $\checkmark \quad \checkmark$   
 $8 \quad 8$

7.1. 1.  $a = 7 \quad d = 8$

$$\begin{aligned} T_n &= a + (n-1)d \\ &= 7 + (n-1)(8) \\ &= 7 + (8n-8) \\ &= 7 + 8n - 8 \\ &= 8n - 1 \end{aligned} \quad \rightarrow \quad \mathbf{2}$$

7.1. 2.  $T_n = 1255$   
 $8n - 1 = 1255 \checkmark$   
 $n = 157 \checkmark \quad \rightarrow \quad \mathbf{2}$

7.2. Linear = arithmetic

$$4x + 3 - (2x + 1) = 2x + 1 - (2x - 5)$$

$$4x + 3 - 2x - 1 = 2x + 1 - 2x + 5$$

$$2x = 4$$

$$x = 2 \checkmark \quad \rightarrow \quad \mathbf{2}$$

8.1.  $\sin P = \frac{QS}{PQ} \checkmark \quad \text{or} \quad \frac{QR}{PR} \checkmark$   
 $\downarrow \quad \downarrow$   
 Small  $\triangle PQS$       big  $\triangle PQR$        $\mathbf{2}$

8.2.  $\hat{A} = 64,3^\circ \quad \hat{B} = 52,3^\circ$

8.2. 1.  $\cos\left(\frac{A}{2}\right)$   
 $= \cos\left(\frac{64,3^\circ}{2}\right)$   
 $= 0,85 \checkmark \quad \rightarrow \quad \mathbf{1}$

8.2. 2.  $\frac{\sin B}{3}$   
 $= \frac{\sin(52,3^\circ)}{3}$   
 $= 0,26 \checkmark \quad \rightarrow \quad \mathbf{1}$

8.2. 3.  $\tan A + 10$   
 $= \tan(64,3^\circ) + 10$   
 $= 12,08 \checkmark \quad \rightarrow \quad \mathbf{1}$

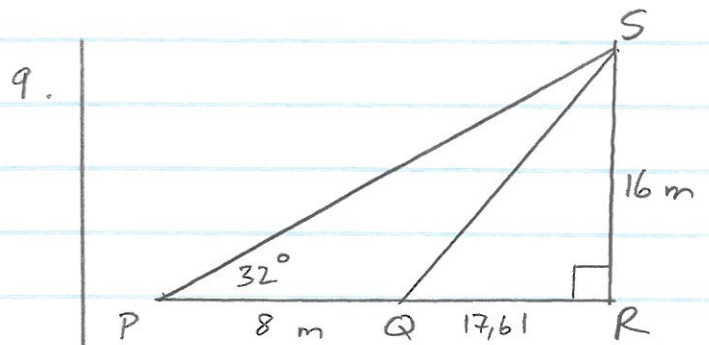
8.2. 4.  $5 \operatorname{Cosec} B$   
 $= 5 \operatorname{Cosec}(52,3^\circ)$   
 $= 5 \times \frac{1}{\sin(52,3^\circ)}$   
 $= 6,32 \checkmark \quad \rightarrow \quad \mathbf{1}$

8.2. 5.  $3 \sin^2 A$   
 $= 3 (\sin A)^2$   
 $= 3 (\sin(64,3^\circ))^2$   
 $= 2,44 \checkmark \quad \rightarrow \quad \mathbf{1}$

8.3. 1.  $\cos \theta = 0,866$   
 $\theta = \cos^{-1}(0,866)$   
 $\theta = 30^\circ \checkmark$  1

8.3. 2.  $\cot \theta = 4,571$   
 $\frac{1}{\tan \theta} = 4,571$   
 $\cot \theta = \tan \theta$   
 $(\because \tan \theta \neq 0)$   
 $1 = 4,571 \cdot \tan \theta$   
 $\frac{1}{4,571} = \tan \theta \checkmark$   
 $\tan^{-1}(0,21\dots) = \theta$   
 $12,34^\circ = \theta \checkmark$  2

8.3. 3.  $A = 2\theta - 54^\circ$   
 $3 \sin A = 2,88$   
 $\sin A = \frac{24}{25} \checkmark \quad 0,96$   
 $A = \sin^{-1}\left(\frac{24}{25}\right)$   
 $2\theta - 54^\circ = 73,73\dots^\circ \checkmark$   
 $\theta = 63,87^\circ \checkmark$  3



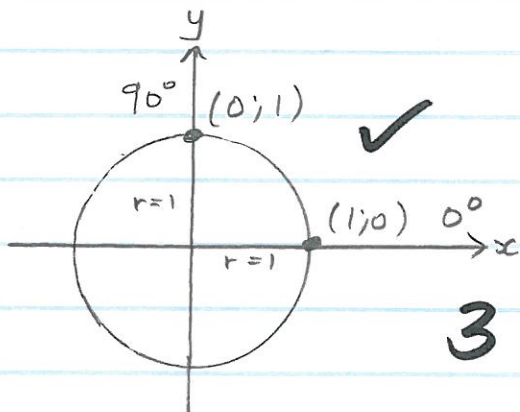
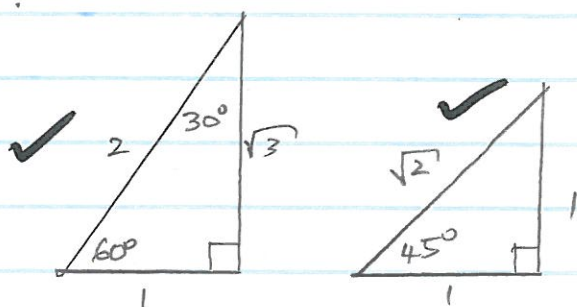
9.1.  $\frac{16}{PR} = \tan 32^\circ \checkmark$   
 $16 = PR \cdot 0,62\dots$   
 $\checkmark \frac{16}{0,62\dots} = PR$    
 $\underline{25,61 \text{ m} = PR} \checkmark$  3

9.2.  $QR = 25,61 - 8$   
 $= 17,61 \text{ m} \checkmark$  1

9.3.  $\tan \hat{SQR} = \frac{16}{17,61} \checkmark$   
 $\hat{SQR} = \tan^{-1}(0,90\dots)$   
 $= 42,26^\circ \checkmark$    
 2



10.1.



10.2.1.  $\tan 30^\circ = \frac{1}{\sqrt{3}}$  ✓  $\frac{a}{b}$  1

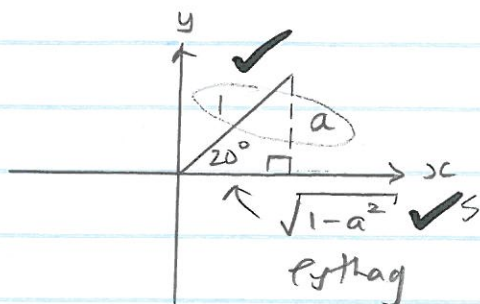
10.2.2.  $\cos 0^\circ = \frac{1}{1}$  ✓  $\frac{b}{r}$  1

10.2.3.  $\sin 45^\circ = \frac{1}{\sqrt{2}}$  ✓  $\frac{a}{r}$  1

10.2.4.  $\sec 60^\circ = \frac{2}{1}$  ✓  $\frac{r}{a}$  1

10.3.

$\sin 20^\circ = a = \frac{9}{13}$   $\frac{a}{r}$



$\tan 20^\circ = \frac{a}{\sqrt{1-a^2}}$   $\frac{a}{b}$  3

10.4.

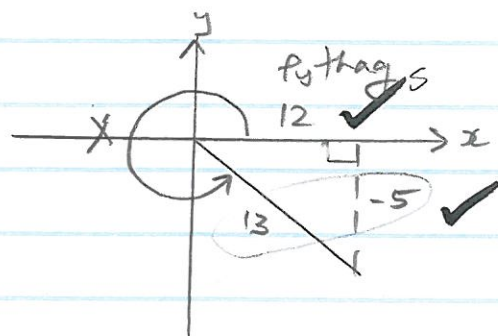
$\sin \hat{X} = \frac{-5}{13} = \frac{y}{r}$

∴ Q III IV

$\cos \hat{X} > 0$  i.e. +

∴ Q I IV

So Q IV :



∴  $\cos \hat{X} = \frac{12}{13}$  ✓  $\frac{b}{r}$  3