

# National 5

## Exam Solutions

2015 SQA Exam

## Paper 1

1.  $6 - 2 = 4$

$$4\frac{1}{5} - \frac{1}{3}$$

$$\frac{21}{5} - \frac{1}{3}$$

$$\frac{63}{15} - \frac{5}{15}$$

$$\frac{58}{15} = 3\frac{13}{15}$$

2.  $11 - 2 - 6x < 39$

$$9 - 6x < 39$$

$$-30 < 6x$$

$$-5 < x$$

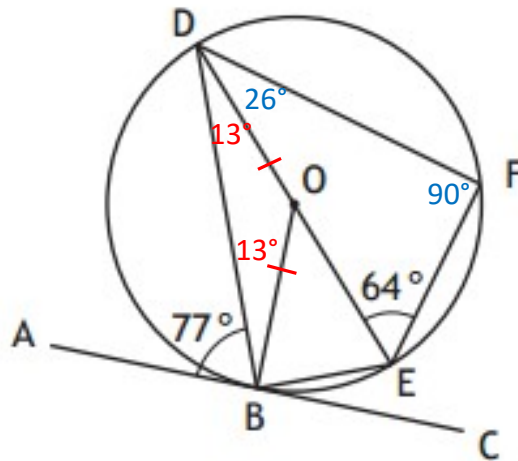
$$x > -5$$

3.

$$90^\circ - 77^\circ = 13^\circ$$

$$180^\circ - 90 - 64 = 26^\circ$$

$$26^\circ + 13^\circ = 39^\circ$$



4.  $x^3 + x^2 - 2x$   
 $-4x^2 - 4x + 8$

$$x^3 - 3x^2 - 6x + 8$$

5.  $\bar{x} = \frac{1+2+2+2+8}{5} = \frac{15}{5} = 3$

x	$\bar{x}$	$x - \bar{x}$	$(x - \bar{x})^2$
1	3	-2	4
2	3	-1	1
2	3	-1	1
2	3	-1	1
8	3	5	25
			32

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$$

$$s = \sqrt{\frac{32}{4}} = \sqrt{8}$$

$$a = 8$$

6. Graph max is 4 and min -4

$$a = 4$$

3 waves between 0 and 360

$$b = 3$$

7. a)  $y = (x + a)^2 + b$

TP is (2, -4)

TP is where  $(x + a) = 0$

$$a = -2$$

If  $(x + a) = 0$ , then  $y = b$

$$b = -4$$

b)  $x = 2$

8.  $m = \frac{y_2 - y_1}{x_2 - x_1}$

$$\frac{15 - 5}{3 - (-2)}$$

$$\frac{10}{5} = 2$$

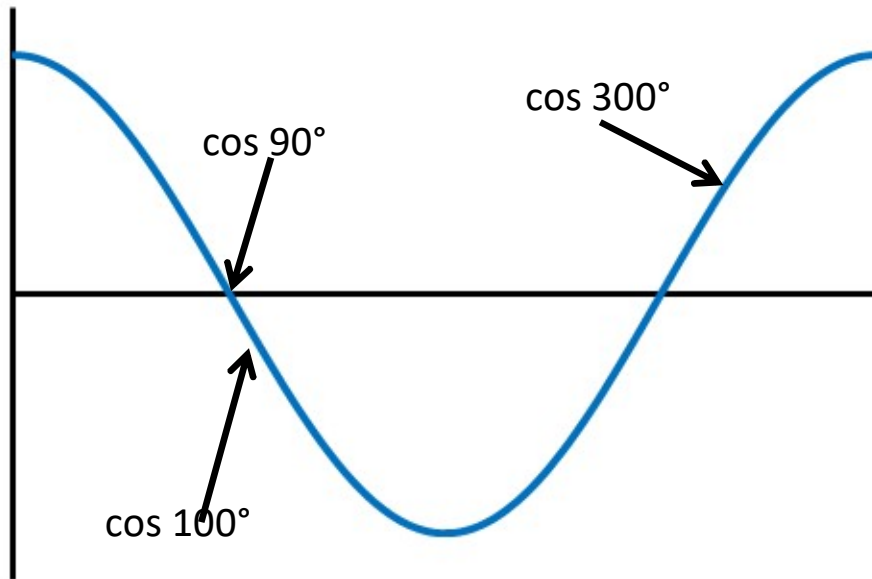
$$y - b = m(x - a) \quad (a, b) = (3, 15)$$

$$y - 15 = 2(x - 3)$$

$$y - 15 = 2x - 6$$

$$y = 2x + 9$$

9.



$$\cos 90^\circ = 0; \quad \cos 100^\circ < 0; \quad \cos 300^\circ > 0$$

In order:  $\cos 100^\circ, \cos 90^\circ, \cos 300^\circ$

10. a)

12	16	17	18	18	21	22	26	27	27
		↓		↓			↓		
		Q1		Q2			Q3		
		17		19.5			26		

$$\text{SIQR} = \frac{26 - 17}{2} = 4.5$$

b)

Median of second round is larger

=> **on average** the scores in the second round are larger

SIQR of second round are lower

=> scores in second round are more consistent

11.  $3x + 2y = 17$  ①  $\times 2$   
 $2x + 5y = 4$  ②  $\times 3$

$6x + 4y = 34$  ③  
 $6x + 15y = 12$  ④

$$11y = -22$$

$$y = -2$$

Sub  $y = -2$  into ①

$$3x - 4 = 17$$
$$3x = 21$$
$$x = 7$$

12.  $\frac{x(x-4)}{(x-4)(x+5)}$

$$\frac{x}{x+5}$$

13.  $\frac{4\sqrt{8}}{\sqrt{8}\sqrt{8}}$

$$\frac{4\sqrt{8}}{8}$$

$$\frac{\sqrt{8}}{2}$$

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

**14.**  $\sqrt[3]{8} = 2$

$$2^5 = 32$$

## Paper 2

1.  $100 + 2 \cdot 8 = 102 \cdot 8\%$

$$240\,000 \times 1 \cdot 028^2$$

$$\text{£}253\,628 \cdot 16$$

2.  $f(a) = 3a + 2 = 23$   
 $3a = 21$   
 $a = 7$

3.  $a^2 = b^2 + c^2 - 2bc \cos A$   
(ignore letters from question and use formula letters)

$$x^2 = 1 \cdot 2^2 + 1 \cdot 35^2 - 2 \times 1 \cdot 2 \times 1 \cdot 35 \times \cos 35^\circ$$

$$x^2 = 0 \cdot 6084473765$$

$$x = 0 \cdot 78 \text{ km (rounded value)}$$

4.  $|\mathbf{u}| = \sqrt{6^2 + (-13)^2 + 18^2}$

$$|\mathbf{u}| = \sqrt{36 + 169 + 324}$$

$$|\mathbf{u}| = \sqrt{529} = 23 \text{ units}$$

5.  $\mathbf{p} = \begin{pmatrix} -5 \\ 3 \end{pmatrix} \quad \mathbf{q} = \begin{pmatrix} 4 \\ -5 \end{pmatrix}$

$$\mathbf{p} + \mathbf{q} = \begin{pmatrix} -5 + 4 \\ 3 + (-5) \end{pmatrix} = \begin{pmatrix} -1 \\ -2 \end{pmatrix}$$



6. a)  $V = \frac{4}{3}\pi r^3$

$$V = \frac{4}{3}\pi \times 6400^3$$

$$V = 1.0980662 \times 10^{12}$$

$$V = 1.1 \times 10^{12}$$

b)  $\frac{1.1 \times 10^{12}}{2.2 \times 10^{10}} = 50$  times bigger

7.  $\frac{5t}{s} \times \frac{2s^2}{t}$

$$\frac{10s^2t}{st}$$

$$10s$$

8. 85% = 297.50

$$100\% = 297.50 \div 0.85$$

$$= \text{£}350$$

9. Scale Factor =  $\frac{30}{24} = 1.25$

$$\text{Area S.F} = 1.25^2 = 1.5625$$

$$\begin{aligned} \text{Area RSP} &= 400 \times 1.5625 \\ &= 625 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{PTQS} &= 625 - 400 \\ &= 225 \text{ cm}^2 \end{aligned}$$

10.  $\frac{\text{angle}}{360} \times \pi d$

$$d = 2l$$

$$\frac{65}{360} \times \pi 2l = 28.4$$

$$\left( \frac{65}{360} \times 2\pi \right) l = 28.4$$

$$(1.1344640138) l = 28.4$$

$$l = 28.4 \div \text{Ans}$$

$$l = 25.03 \text{ cm (rounded)}$$

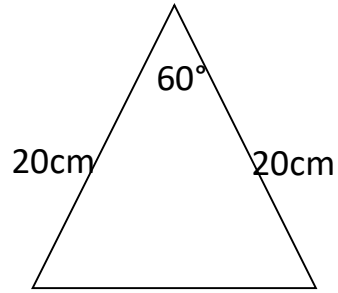
11.  $360^\circ \div 6 = 60^\circ$   
 Diagonals = 40cm,  $\frac{1}{2}40 = 20\text{cm}$

$$A = \frac{1}{2} ab \sin C$$

$$A = \frac{1}{2} 20 \times 20 \sin 60$$

$$A = 173.20508$$

$$\begin{aligned} \text{Total Area} &= 173.20508 \times 6 \\ &= 1039.23 \text{ cm}^2 \text{ (rounded)} \end{aligned}$$



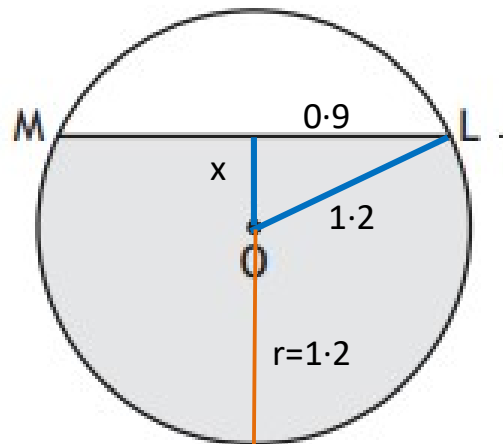
12.  $x^2 = 1.2^2 - 0.9^2$

$$x^2 = 0.63$$

$$\begin{aligned} x &= \sqrt{0.63} \\ &= 0.79 \text{ (rounded)} \end{aligned}$$

$$d = r + x$$

$$d = 1.99 \text{ m}$$



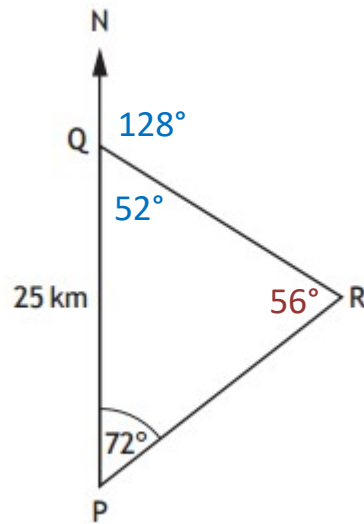
13.  $180 - 128 = 52$

$180 - 52 - 72 = 56$

$$\frac{x}{\sin 52} = \frac{25}{\sin 56}$$

$$x = \frac{25 \sin 52}{\sin 56}$$

$x = 23.76 \text{ km (rounded)}$



14. a)  $x + 13 + x$

$2x + 13$

b)  $L = 2x + 13$  ;  $B = 2x + 9$

$A = L \times B = 270$

$A = (2x + 13)(2x + 9) = 270$

$4x^2 + 18x + 26x + 117 = 270$

$4x^2 + 44x - 153 = 0$

c)  $a = 4, b = 44$  &  $c = -153$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-44 \pm \sqrt{44^2 - 4 \times 4 \times (-153)}}{2 \times 4}$$

$$x = \frac{-44 \pm \sqrt{4384}}{8}$$

$$x = \frac{-44 + \sqrt{4384}}{8} \text{ or } x = \frac{-44 - \sqrt{4384}}{8}$$

$$x = 2.77647267862 \quad x = -13.77647267$$

$$x = 2.8 \quad x \neq -13.8 \text{ as it is a length}$$