

2010 Credit Paper 1

1. $\frac{4}{10}$ of $11.50 - 1.81$

$$= 11.50 \div 10 \times 4 - 1.81$$

$$= 1.15 \times 4 - 1.81$$

$$= 4.60 - 1.81$$

$$= \underline{\underline{\pounds 2.79}}$$

$$\begin{array}{r} 3 \quad 15 \\ 4 \cdot 60 \\ - 1.81 \\ \hline 2.79 \end{array}$$

2. $\frac{2}{5} \div 1\frac{1}{10}$

$$= \frac{2}{5} \div \frac{11}{10}$$

$$= \frac{2}{5} \times \frac{10}{11}$$

$$= \frac{20}{55}$$

$$= \underline{\underline{\frac{4}{11}}}$$

3. $t = \frac{7s + 4}{2}$

$$2t = 7s + 4$$

$$2t - 4 = 7s$$

$$\frac{2t - 4}{7} = s \Rightarrow s = \underline{\underline{\frac{2t - 4}{7}}}$$

4a) $x^2 - 4x = 2x + 7$

$$x^2 - 4x - 2x - 7 = 0$$

$$x^2 - 6x - 7 = 0$$

b) $(x - 7)(x + 1) = 0$

$$x - 7 = 0 \quad \text{or} \quad x + 1 = 0$$

$$\therefore \underline{\underline{x = 7}} \quad \text{or} \quad \underline{\underline{x = -1}}$$

5a) $P(\text{black}) = \frac{4}{9}$, $P(\text{white}) = \frac{5}{9}$

b) $\frac{5}{9} \times 27$

$$= 27 \div 9 \times 5$$

$$= 3 \times 5$$

$$= \underline{\underline{15 \text{ marbles}}}$$

6. $100\% + 20\% \text{ extra.}$

$$120\% = 900\text{g}$$

$$20\% = 900 \div 6$$

$$= 150\text{g}$$

$$100\% = 150 \times 5$$

$$= \underline{\underline{750\text{g}}}$$

7a) $y = mx + c$

at $(2, 7)$

$$7 = 2m + c$$

b) $y = mx + c$

at $(4, 17)$

$$17 = 4m + c$$

c) $2m + c = 7$ ①

$$- 4m + c = 17$$
 ②

$$\hline -2m = -10$$

$$\underline{\underline{m = 5}}$$

Sub $m = 5$ into ①

$$2(5) + c = 7$$

$$10 + c = 7$$

$$c = 7 - 10$$

$$\underline{\underline{c = -3}}$$

$$y = 5x - 3.$$

d) gradient = 5.

$$\begin{aligned} 8a) \quad & \sqrt{2} \times \sqrt{18} \\ & = \sqrt{2 \times 18} \\ & = \sqrt{36} \\ & = \underline{\underline{6}} \end{aligned}$$

$$\begin{aligned} b) \quad & \sqrt{2} + \sqrt{18} \\ & = \sqrt{2} + \sqrt{9 \times 2} \\ & = \sqrt{2} + 3\sqrt{2} \\ & = \underline{\underline{4\sqrt{2}}} \end{aligned}$$

$$\begin{aligned} c) \quad & \frac{\sqrt{2} \times \sqrt{18}}{\sqrt{2} + \sqrt{18}} \\ & = \frac{6}{4\sqrt{2}} \end{aligned}$$

$$\begin{aligned} & = \frac{6}{4\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} \\ & = \frac{6\sqrt{2}}{4 \times 2} \\ & = \frac{3\sqrt{2}}{4} \end{aligned}$$

$$\begin{aligned} 9a) \quad & y = \frac{1}{3}x + 2 \\ \text{on } x\text{-axis, } & y = 0 \\ & \frac{1}{3}x + 2 = 0 \\ & \frac{1}{3}x = -2 \\ & x = \underline{\underline{-6}} \\ & B \underline{\underline{(-6, 0)}} \end{aligned}$$

$$b) \quad y < 0 \text{ when } x < -6$$

10a)

$$1^3 + 2^3 + 3^3 + 4^3 + 5^3 = \frac{5^2 \times 6^2}{4}$$

$$b) \quad 1^3 + 2^3 + \dots + n^3 = \frac{n^2 + (n+1)^2}{4}$$

$$\begin{aligned} c) \quad 1^3 + 2^3 + 3^3 + \dots + 9^3 & = \frac{9^2 \times 10^2}{4} \\ & = \frac{81 \times 100}{4} \\ & = \frac{8100}{4} \\ & = \underline{\underline{2025}} \end{aligned}$$

$$\begin{aligned} \text{ii. } A_1 & = \frac{1}{2} \times \frac{x}{2} \times 1 \\ & = \frac{x}{4} \end{aligned}$$

$$\begin{aligned} A_2 & = \frac{1}{2} \times (x-1) \times 3 \\ & = \frac{3}{2}(x-1) \end{aligned}$$

$$\therefore \frac{x}{4} = \frac{3}{2}(x-1) \quad (\times 4)$$

$$x = \frac{12}{2}(x-1)$$

$$x = 6(x-1)$$

$$x = 6x - 6$$

$$6 = 6x - x$$

$$6 = 5x$$

$$x = \underline{\underline{\frac{6}{5}}}$$

2010 Credit Paper 2

1. Weight = $84000 \times (0.75)^3$
 $= 35437.5$
 $= \underline{\underline{35400 \text{ (to 3SF)}}$

2. $x(x-1)^2$
 $= x(x-1)(x-1)$
 $= x(x^2 - 2x + 1)$
 $= \underline{\underline{x^3 - 2x^2 + x}}$

3a) mean, $\bar{x} = \frac{808}{8} = 101$

x	$x - \bar{x}$	$(x - \bar{x})^2$
102	1	1
102	1	1
101	0	0
98	-3	9
99	-2	4
101	0	0
103	2	4
102	1	1

$\Sigma(x - \bar{x})^2 = 20$

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

$= \sqrt{\frac{20}{7}}$

$= 1.690 \dots$

$= 1.69$

b) • The second machine had, on average two more pins

• The second machine has higher standard deviation and hence greater variation in numbers.

4. $a = 3, b = 5, c = -7$

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

$x = \frac{-5 \pm \sqrt{5^2 - 4(3)(-7)}}{2 \times 3}$

$= \frac{-5 \pm \sqrt{25 + 84}}{6}$

$= \frac{-5 \pm \sqrt{109}}{6}$

$x = \frac{-5 + \sqrt{109}}{6}$ or $x = \frac{-5 - \sqrt{109}}{6}$

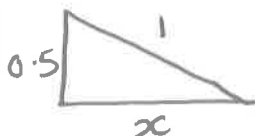
$x = 0.907 \dots$

$x = -2.573 \dots$

$x = 0.9$

$x = -2.6$

5a) *Answer:*



$x^2 = 1^2 - 0.5^2$

$x^2 = 1 - 0.25$

$x^2 = 0.75$

$x = \sqrt{0.75}$

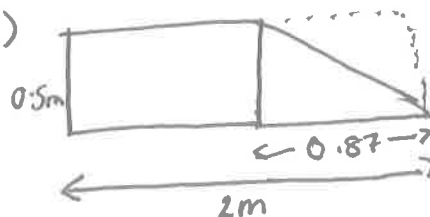
$x = 0.866 \dots$

$x = 0.87$ to 2dp.

b) $A_{tri} = \frac{1}{2}(0.87)(0.5)$
 $= \underline{\underline{0.22m^2}}$

$A_{rec} = 2 \times 0.5$
 $= \underline{\underline{1m^2}}$

Total Area = $1 - 0.22$
 $= \underline{\underline{0.78m^2}}$



Volume = Area \times height

$= 0.78 \times 2$

$= 1.56m^3$

2010 Credit Paper 2

6. $AL = \frac{x}{360} \times \pi \times d$ $r = 36$
 $d = 72.$

$$= \frac{140}{360} \times \pi \times 72$$

$$= 87.964 \dots$$

$$= \underline{\underline{87.9 \text{ cm.}}}$$

7. Scale factor: length

$$\text{enlarge (vol)} = \frac{1600}{200}$$

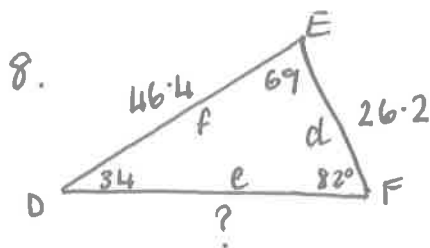
$$= 8$$

$$\text{Scale factor (length)} = \sqrt[3]{8}$$

$$= 2$$

$$\text{Salon bottle} = 2 \times 12$$

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



Method #1

$$\frac{d}{\sin D} = \frac{e}{\sin E} = \frac{f}{\sin F}$$

$$\frac{e}{\sin 64} = \frac{46.4}{\sin 82}$$

$$e = \frac{46.4 \sin 64}{\sin 82}$$

$$e = 42.113 \dots$$

$$e = \underline{\underline{42.1 \text{ m.}}}$$

Method #2

$$e^2 = d^2 + f^2 - 2df \cos E$$

$$= (26.2)^2 + (46.4)^2 - 2(26.2)(46.4) \cos 64$$

$$= 1773.561 \dots$$

$$= 1773.6$$

$$e = \sqrt{1773.6}$$

$$e = \underline{\underline{42.1 \text{ m}}}$$

$$\text{Perimeter} = d + e + f$$

$$= 46.4 + 26.2 + 42.1$$

$$= \underline{\underline{114.7 \text{ m}}}$$

$$1000 \div 114.7 \text{ m} = 8.718 \dots$$

They must run 9 circuits to cover 1000m.

9. Sugar: fruit = 5:4

$0.80 \times \text{Sugar}$	$1.20 \times \text{fruit}$
$= 0.80 \times 5$	1.2×4
$= \underline{\underline{4}}$	$= \underline{\underline{4.8}}$

$$4 : 4.8$$

$$= 40 : 48$$

$$= \underline{\underline{5 : 6}}$$

10.

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

$$= \frac{1}{2} qr \sin P$$

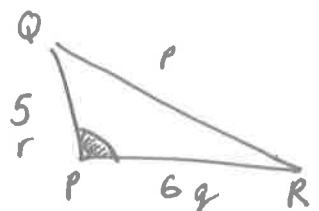
$$12 = \frac{1}{2} (6)(5) \sin P$$

$$24 = 30 \sin P$$

$$\sin P = \frac{24}{30}$$

$$P = \sin^{-1}\left(\frac{12}{15}\right)$$

$$P = 53.1^\circ \text{ (acute)}$$



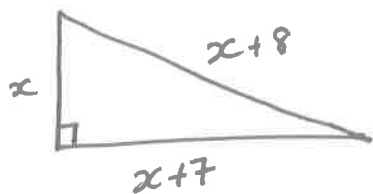
$$\therefore \text{Obtuse angle}$$

$$= 180 - 53.1$$

$$= \underline{\underline{126.9^\circ}}$$

11 a) No longer in course.

12



$$(x+8)^2 = (x+7)^2 + x^2$$

$$x^2 + 16x + 64 = x^2 + 14x + 49 + x^2$$

$$x^2 + 16x + 64 = 2x^2 + 14x + 49$$

$$0 = x^2 - 2x - 15$$

$$0 = (x-5)(x+3)$$

$$\text{either } x-5=0 \quad x+3=0$$

$$\underline{x=5} \quad \text{or} \quad \underline{x=-3}$$

$$\therefore \underline{\underline{x = 5\text{cm}}}$$

13a) $D = 3 + 1.75 \sin 30h^\circ$

When $h=5$

$$D = 3 + 1.75 \sin 150^\circ$$

$$D = 3.875$$

$$\underline{\underline{D = 3.9\text{m}}}$$

b) $\text{max} = 1.75, \text{min} = -1.75$

(Values from $1.75 \sin 30h$)

$$\begin{aligned} \text{max depth} &= 3 + 1.75 \\ &= 4.75\text{m} \end{aligned}$$

$$\begin{aligned} \text{min depth} &= -1.75 + 3 \\ &= 1.25\text{m} \end{aligned}$$

$$\begin{aligned} \text{difference} &= 4.75 - 1.25 \\ &= \underline{\underline{3.5\text{m}}} \end{aligned}$$

2010 Int 2 Paper 1

1. $A(0,8)$ $B(6,0)$

$$\frac{y_A - y_B}{x_A - x_B} = \frac{8 - 0}{0 - 6} = \frac{8}{-6} = \frac{-4}{3}$$

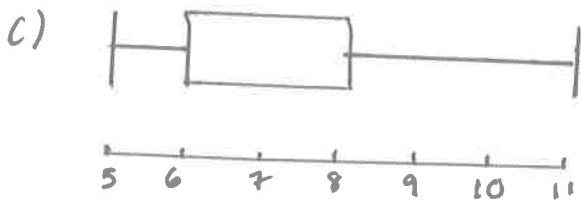
$$C = 8$$

$$y = mx + c$$

$$y = \frac{-4}{3}x + 8$$

2a) not in course

b) $Q_1 = 6$ $Q_2 = 7$ $Q_3 = 8$



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

$$= \frac{4}{3} \times 3.14 \times 3 \times 3 \times 3$$

$$= 4 \times 3.14 \times 9$$

$$= 113.04 \text{ cm}^3$$

3.14
9

28.26
3x 124

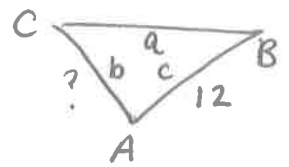
113.04

4a) $x^2 + x - 6$
 $= (x+5)(x-1)$

b) $(3x+2)(x^2+5x-1)$
 $= 3x^3 + 15x^2 - 3x + 2x^2 + 10x - 2$
 $= 3x^3 + 17x^2 + 7x - 2$

5. $y = -x^2$ $(-3, k)$
 $k = -(-3)^2$
 $k = -9$

6.



$$\frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{b}{1/3} = \frac{12}{1/2}$$

$$3b = 24$$

$$\underline{\underline{b = 8 \text{ cm}}}$$

$$b \div 1/3$$

$$b \times 3/1$$

$$= 3b$$

$$12 \div 1/2$$

$$12 \times 2/1$$

$$= \underline{\underline{24}}$$

7. $p^3(p^2 - p^{-3})$
 $= p^5 - p^0$
 $= \underline{\underline{p^5 - 1}}$

8. $b^2 - 4ac$ $a = 1$
 $9 - 4(1)(5)$ $b = 3$
 $9 - 20$ $c = 5$
 $= \underline{\underline{-11}}$

$b^2 - 4ac < 0$ there are no real roots/solutions

9. Graph has slid left 45°
 $\therefore y = \cos(x+45)^\circ$

10 a) $a = -5$ (moved right by 5)

b) $Q(8,0)$

c) $y = (x+a)^2 + b$
 $y = (x-5)^2 + b$

at $(2,0)$

$$0 = (2-5)^2 + b$$

$$0 = 3^2 + b$$

$$\underline{\underline{-9 = b}}$$

$$y = (x-5)^2 - 9$$

$$1. 176500 \times 0.9575^3$$

$$= 154\,939.11$$

$$= \underline{\underline{155\,000 \text{ (3SF)}}}$$

$$2. \text{Pasta: } \frac{30}{72} \times 360 = 150^\circ$$

$$\text{Potato: } \frac{40}{72} \times 360 = 200^\circ$$

$$\text{Salad: } \frac{2}{72} \times 360 = 10^\circ$$

$$3. p = 2 + 1.5(6)$$

$$= 2 + 9$$

$$= \underline{\underline{11}}$$

$$4 \text{ ai) } \bar{x} = \frac{49}{7} = 7.$$

ii) x	$x - \bar{x}$	$(x - \bar{x})^2$
13	6	36
7	0	0
0	-7	49
9	2	4
7	0	0
8	1	1
5	-2	4
		<hr/> 94

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

$$= \frac{\sqrt{94}}{6}$$

$$= \underline{\underline{3.96}}$$

b) • The number of points scored is higher on average.

• The new coach has lower s.d and so more consistent results

$$5. \begin{aligned} 2x - 5y &= 24 \quad (\times 8) \\ 7x + 8y &= 33 \quad (\times 5) \end{aligned}$$

$$\begin{aligned} 16x - 40y &= 192 \\ + 35x + 40y &= 165 \\ \hline 51x &= 357 \end{aligned}$$

$$x = 7$$

$$\downarrow$$

$$2x - 5y = 24$$

$$2(7) - 5y = 24$$

$$-5y = 24 - 14$$

$$-5y = 10$$

$$y = \underline{\underline{-2}}$$

$$6. \frac{s^2}{t} \times \frac{3t}{2s}$$

$$= \frac{3s^2 \cancel{t}}{2s \cancel{t}}$$

$$= \underline{\underline{\frac{3s}{2}}}$$

$$7. p = 2(L + B)$$

$$\frac{p}{2} = L + B$$

$$L = \frac{p}{2} - B$$

$$8. \sqrt{63} + \sqrt{28} - \sqrt{7}$$

$$= \sqrt{9 \times 7} + \sqrt{4 \times 7} - \sqrt{7}$$

$$= 3\sqrt{7} + 2\sqrt{7} - \sqrt{7}$$

$$= \underline{\underline{4\sqrt{7}}}$$

2010 Int 2 paper 2

9. A sector = $\frac{65}{360} \times 14^2 \times \pi$

= 111.177...

= 111.2 cm²

A rectangle = 40×14
= 560 cm²

Area = $2(111.2) + 2(560)$
= 1342.4 cm²

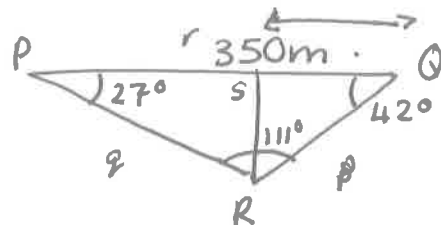
10a) $A = (x+7)(x+3)$
= $x^2 + 3x + 7x + 21$
= $x^2 + 10x + 21$

b) $x^2 + 10x + 21 = 45$
 $x^2 + 10x - 24 = 0$
 $(x+12)(x-2) = 0$
 $x = -12$ or $x = 2$

cannot have $x = 2$
 $x \neq 3$ as a length

11. $V_{cyl} = \pi r^2 h$
 $3260 = \pi \times 6.4^2 \times h$
 $h = \frac{3260}{\pi \times 6.4^2}$
= 25.334...
= 25.3 cm

12. QR



$\frac{p}{\sin P} = \frac{r}{\sin R}$

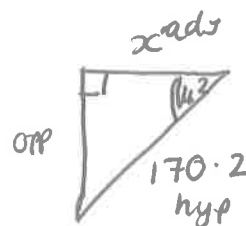
$\frac{p}{\sin 27} = \frac{350}{\sin 111}$

$p = \frac{350 \sin 27}{\sin 111}$

$p = 170.201...$

$p = 170.2 m$

$\cos x = \frac{\text{adj}}{\text{hyp}}$



$\cos 42 = \frac{x}{170.2}$

$x = 170.2 \cos 42$
= 126.483...

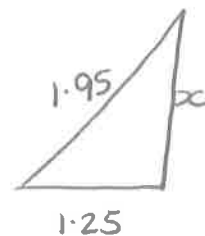
$QS = 126.5 m$

13.

$x^2 = 1.95^2 - 1.25^2$
= 2.24

$x = \sqrt{2.24}$

$x = 1.5$



height = $1.5 + 1.95$
= 3.45 m

14. $h = 15 \tan x + 1.7$
at $x = 25^\circ$

a) $h = 15 \tan 25 + 1.7$
= 8.7 m

b) $18.4 = 15 \tan x + 1.7$
 $\tan x = \frac{18.4 - 1.7}{15}$

$x = \tan^{-1}(1.113)$ $x = 48.1^\circ$

Credit 2011 paper 1

$$\begin{aligned} 1. & 2.4\bar{3} + 5.46 \div 60 \\ & = 2.4\bar{3} + 0.091 \\ & = \underline{\underline{2.491}} \end{aligned}$$

$$\begin{array}{r} 0.91 \\ 6 \overline{) 5.46} \\ \underline{6} \\ 0.91 \\ \underline{0} \\ 0.91 \\ \underline{0} \\ 0.91 \end{array}$$
$$\frac{0.91}{10} = 0.091$$
$$\begin{array}{r} 2.4\bar{3} \\ + 0.091 \\ \hline 2.491 \end{array}$$

$$\begin{aligned} 2. & 2m^2 - 18 \\ & = 2(m^2 - 9) \\ & = \underline{\underline{2(m+3)(m-3)}} \end{aligned}$$

$$\begin{aligned} 3. & f(x) = 5 - x^2 \\ & f(-3) = 5 - (-3)^2 \\ & = 5 - 9 \\ & = \underline{\underline{-4}} \end{aligned}$$

$$\begin{aligned} 4. & 3x + 1 = \frac{x-5}{2} \\ \therefore & 2(3x+1) = x-5 \\ \therefore & 6x+2 = x-5 \\ & 6x-x = -5-2 \\ & 5x = -7 \\ & x = \underline{\underline{\frac{-7}{5}}} \end{aligned}$$

$$\begin{aligned} 5. & 7 \div \frac{2}{5} \\ & = 7 \times \frac{5}{2} \\ & = \frac{35}{2} \\ & = 17\frac{1}{2} \therefore 17 \text{ cakes.} \end{aligned}$$

6. median of 30: between 15 and 16
 \Rightarrow median = 4

$$\begin{aligned} b) & P(T > 4) = \frac{14}{30} \\ & = \frac{7}{15} \end{aligned}$$

$$\begin{aligned} 7a) & 2a + 4c = 56 \quad \textcircled{1} \\ b) & a + 3c = 36 \quad \textcircled{2} \quad (\times 2) \end{aligned}$$

$$\begin{array}{r} 2a + 4c = 56 \\ - \quad a + 6c = 72 \quad - \\ \hline -2c = -16 \\ \underline{\underline{c = 8}} \end{array}$$

Child: £8

Sub into $\textcircled{2}$: $c = 8$

$$a + 3c = 36$$

$$a + 3(8) = 36$$

$$a + 24 = 36$$

$$\underline{\underline{a = 12}}$$

Adult: £12.

$$8a) \quad T(0, 12) \quad Q(8, 8) \quad R(\del{8, 8})_{8, 0}$$

$$m_{TR} = \frac{y_T - y_R}{x_T - x_R}$$

$$= \frac{12 - 0}{0 - 8}$$

$$= \frac{12}{-8}$$

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

$$\underline{\underline{y = -\frac{3}{2}x + 12.}}$$

b) $P(x, 8)$ Credit 2011 p1

at $y=8$:

$$8 = -\frac{3}{2}x + 12$$

$$-4 = -\frac{3}{2}x$$

$$-8 = -3x$$

$$\frac{8}{3} = x$$

$$\underline{\underline{P\left(\frac{8}{3}, 8\right)}}$$

9a) $2a \times a^{-4}$

$$= 2a^{-3}$$

$$= \frac{2}{a^3}$$

b) $\sqrt{x} + \sqrt{18} = 4\sqrt{2}$

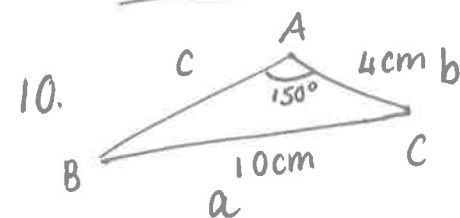
$$\sqrt{x} = 4\sqrt{2} - \sqrt{18}$$

$$\sqrt{x} = 4\sqrt{2} - \sqrt{9 \times 2}$$

$$\sqrt{x} = 4\sqrt{2} - 3\sqrt{2}$$

$$\sqrt{x} = \sqrt{2}$$

$$\underline{\underline{x = 2}}$$



$$\frac{a}{\sin A} = \frac{b}{\sin B} \quad \sin 150^\circ = \sin 30^\circ$$

$$\frac{10}{\sin 30} = \frac{4}{\sin B}$$

$$10 \sin B = 4 \sin 30$$

$$10 \sin B = 4 \times \frac{1}{2}$$

$$\sin B = \frac{2}{10} = \frac{1}{5}$$

11. No longer in course.

12a) $S_{10} = \frac{1}{2}(10 \times 11)$
 $= \frac{1}{2}(110)$
 $= \underline{\underline{55}}$

b) $S_n = \frac{1}{2}(n \times (n+1))$
 $= \underline{\underline{\frac{1}{2}(n^2 + n)}}$

2011 Credit Paper 2

1. 10% increase $\Rightarrow 1.1$
4 weeks $\Rightarrow 1.1^4$

$$\text{distance} = \cancel{28} \times 28 \times 1.1^4$$
$$= \underline{\underline{41 \text{ miles}}}$$

2. $(3x+1)(x^2-5x+4)$

$$= 3x^3 - 15x^2 + 12x + x^2 - 5x + 4$$
$$= \underline{\underline{3x^3 - 14x^2 + 7x + 4}}$$

3. $a=2, b=3, c=-7$

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

$$x = \frac{-3 \pm \sqrt{3^2 - 4(2)(-7)}}{2 \times 2}$$

$$x = \frac{-3 \pm \sqrt{9 + 56}}{4}$$

$$x = \frac{-3 + \sqrt{65}}{4} \quad x = \frac{-3 - \sqrt{65}}{4}$$

$$x = 1.26$$

$$x = -2.77$$

$$\underline{\underline{x = 1.3}}$$

$$\underline{\underline{x = -2.8}}$$

4. 84% = 3780

$$1\% = 3780 \div 84$$

$$= 45$$

$$100\% = 45 \times 100$$

$$= \underline{\underline{\pounds 4500}}$$

5. $AL = \frac{x}{360} \times \pi \times d$

$$= \frac{42}{360} \times \pi \times 2.4$$

$$= 0.879 \dots$$

$$= \cancel{0.879} = 0.88 \text{ m}$$

$0.88 < 0.9 \text{ m} \therefore$ does not pass.

6. Scale factor: enlargement

$$\text{S.F.} = \frac{125}{90} = \frac{25}{18}$$

$$\text{SF (Area)} = \left(\frac{25}{18}\right)^2$$

$$\text{Area B} = \left(\frac{25}{18}\right)^2 \times 4020$$
$$= \underline{\underline{7755 \text{ cm}^2}}$$

$$4020 \times 2 = 8040$$

$\therefore \text{Area B} \neq 2 \times \text{Area A}$.

Claim is not justified.

7a) Angle ABC = $180 - 72$
 $= \underline{\underline{108^\circ}}$

b)

$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$= 1 + 1 - 2(1)(1) \cos 108$$

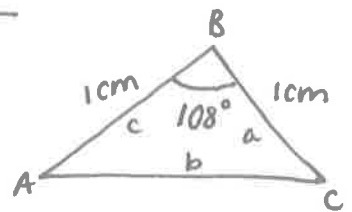
$$= 2.618 \dots$$

$$b^2 = 2.6 \text{ cm}$$

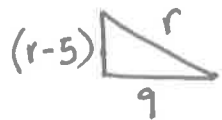
$$b = \sqrt{2.6}$$

$$b = 1.612 \dots$$

$$\underline{\underline{b = 1.6 \text{ cm}}}$$



8.



$$r^2 = (r-5)^2 + 9^2$$

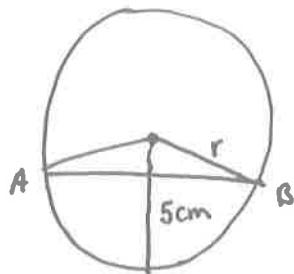
$$r^2 = r^2 - 10r + 25 + 81$$

$$r^2 = r^2 - 10r + 106$$

$$0 = -10r + 106$$

$$10r = 106$$

$$r = 10.6$$



AB = 18 cm

9a)

$$A_1 = 32 \times 24 = 768 \text{ cm}^2$$

$$A_2 = 18 \times 24 = 512 \text{ cm}^2$$

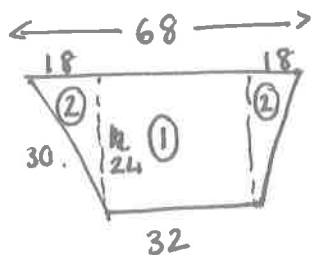
$$\text{Total Area} = 768 + 512 = 1200 \text{ cm}^2$$

b) $V = Ah$ or $V = AL$

$$156,000 = 1200 \times L$$

$$L = \frac{156000}{1200}$$

$$L = 130 \text{ cm}$$



Area

11.

$$A = lb$$

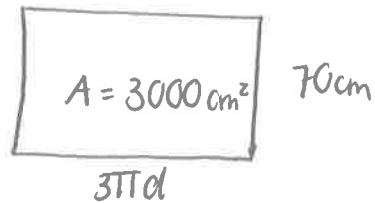
$$3000 = 70 \times 3\pi d$$

$$3000 = 210\pi d$$

$$d = \frac{3000}{210\pi}$$

$$d = 4.547 \dots$$

$$\underline{\underline{d = 4.5 \text{ cm}}}$$



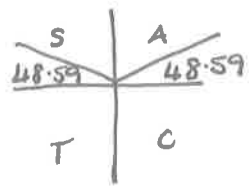
12a) max = 1, min = -7

$$p(90, 1)$$

b) $4\sin x - 3 = 0$

$$4\sin x = 3$$

$$\sin x = 3/4$$



$$x^\circ = 48.59, 180 - 48.59$$

$$x^\circ = 48.6, 131.4^\circ$$

$$\underline{\underline{Q = (48.6)}} \quad \underline{\underline{R = (131.4^\circ)}}$$

13.

$$48 - 8t - t^2 = 0$$

$$(12 - t)(4 + t) = 0$$

$$t = 12 \text{ or } t = -4$$

$$\underline{\underline{t = 12 \text{ seconds}}}$$

10. $x =$ hourly rate.

$$15x + 8x + 16x = 429$$

$$39x = 429$$

$$x = \frac{429}{39}$$

$$\underline{\underline{x = 11}}$$

$$\text{Tom: } 11 \times 15 = \underline{\underline{£165}}$$

$$\text{Tom} = 15x$$

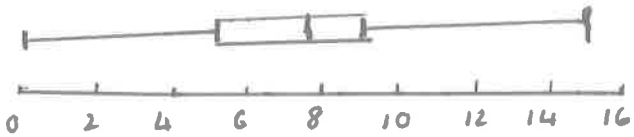
$$\text{Samia} = 8x$$

$$\text{Harry} = \frac{4}{3} \times 12x = 16x$$

2011 Int 2 Paper 1

1a) 0 2 5 6 6 7 8 9 11 15

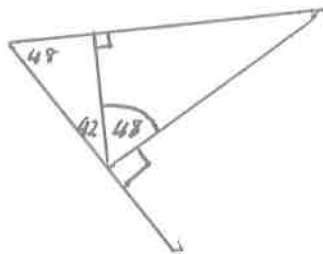
L = 0
 Q₁ = 5
 Q₂ = 6.5
 Q₃ = 9
 H = 15



b) • In general the train is late less.
 • The spread of lateness is far less.

2) $5x + (3x+2)(2x-7)$
 $= 5x + 6x^2 - 21x + 4x - 14$
 $= \underline{\underline{6x^2 - 12x - 14}}$

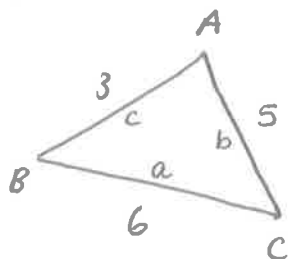
3) $EPR = 90 + 48$
 $= \underline{\underline{138^\circ}}$



4) $2\sqrt{6}$, $\sqrt{2} \times \sqrt{12}$, $\sqrt{3} \sqrt{8}$, $\sqrt{24}$
 $= \sqrt{24}$, $= 3\sqrt{4 \times 2}$, $= \sqrt{4 \times 6}$
 $= \sqrt{4 \times 6}$, $= 6\sqrt{2}$, $= \underline{\underline{2\sqrt{6}}}$
 $= \underline{\underline{2\sqrt{6}}}$

∴ $3\sqrt{8}$ is different.

5) $\cos B = \frac{a^2 + c^2 - b^2}{2ac}$
 $= \frac{6^2 + 3^2 - 5^2}{2(6)(3)}$
 $= \frac{20}{36}$
 $= \frac{5}{9}$

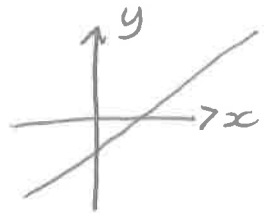


6) $9^{\frac{3}{2}}$
 $= \sqrt[2]{9^3}$
 $= 3^3$
 $= \underline{\underline{27}}$

7) $\max/\min = -5 \rightarrow 5$
 ∴ $a = 5$.

graph occurs 4 times in 360
 ∴ $\underline{\underline{b = 4}}$

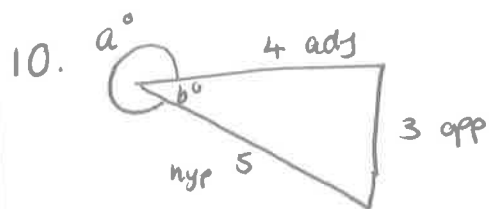
8) $m > 0$ positive gradient
 $c < 0$ negative intercept



9a) $x^2 - 4x - 21$
 $(x-7)(x+3)$

b) $(x-7) = 0$ $(x+3) = 0$
 $x = 7$ $x = \underline{\underline{-3}}$

c) $x^2 - 4x - 21$
 $(x-2)^2 - 25$ } $(x-2)^2$
 $= x^2 - 4x + 4$
 $\underline{\underline{TP = (4, -2)}}$



$\cos a^\circ = \cos b^\circ$

∴ $\cos a^\circ = \frac{4}{5}$

2011 Int 2 Paper 2.

$$1. \frac{y_A - y_B}{x_A - x_B}$$

$$= \frac{5 - (-4)}{-3 - 7}$$

$$= \frac{9}{-10}$$

$$A(-3, 5)$$

$$B(7, -4)$$

$$2. 134750 \times 1.0315^3$$

$$= 147889.2038$$

$$= \underline{\underline{\pounds 147900 \text{ (4SF)}}}}$$

$$3. A = 4\pi r^2$$

$$\frac{A}{4\pi} = r^2$$

$$r = \sqrt{\frac{A}{4\pi}}$$

$$4a. V = \pi r^2 h$$

$$= \pi \times 1.5^2 \times 15$$

$$= 106.028 \dots$$

$$= \underline{\underline{106.0 \text{ m}^3}}$$

$$b. V_{\text{cone}} = \frac{1}{3} \pi r^2 h$$

$$5.7 = \frac{1}{3} \times \pi \times 1.5^2 \times h$$

$$3 \times 5.7 = \pi \times 1.5^2 \times h$$

$$h = \frac{3 \times 5.7}{\pi \times 1.5^2}$$

$$h = 2.419 \dots$$

$$\underline{\underline{h = 2.4 \text{ m}}}$$

$$\text{Total height} = 15 + 2.4 \text{ m}$$

$$= \underline{\underline{17.4 \text{ m}}}$$

$$5. \text{Area sector} = \frac{x}{360} \times \pi \times r^2$$

$$= \frac{54}{360} \times \pi \times 7.3^2$$

$$= 25.112 \dots$$

$$= \underline{\underline{25.1 \text{ cm}^2}}$$

$$6a) \bar{x} = \frac{246}{6} = \underline{\underline{41}}$$

x	$x - \bar{x}$	$(x - \bar{x})^2$
43	2	4
39	-2	4
41	0	0
40	-1	1
39	-2	4
44	3	9
		<u>22</u>

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

$$= \frac{22}{5}$$

$$= 2.097 \dots$$

$$= \underline{\underline{2.1}}$$

- b) Yes • mean of 41 lies within the tolerance limits of 38 and 42
 • The standard deviation of 2.1 is less than 3.

$$7a) 24x + 6y = 60$$

$$b) 20x + 10y = 40$$

$$c) 120x + 30y = 300$$

$$- \quad 60x + 30y = 120 \quad -$$

$$60x = 180$$

$$x = 3$$

$$20(3) + 10y = 40$$

$$10y = -20$$

$$y = -2$$

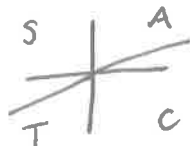
7c) $Dand = 17x + 3 + (13x - 2)$
 $= 51 - 26$
 $= \underline{\underline{25}}$

8) $\frac{3x - 15}{(x - 5)^2}$
 $= \frac{3(x - 5)}{(x - 5)^2}$
 $= \underline{\underline{\frac{3}{x - 5}}}$

9 $\frac{3}{x} - \frac{4}{x+1}$
 $= \frac{3(x+1) - 4x}{x(x+1)}$
 $= \frac{3x + 3 - 4x}{x(x+1)}$
 $= \underline{\underline{\frac{3 - x}{x(x+1)}}}$

10. $2 \tan x - 3 = 5$
 $2 \tan x = 8$
 $\tan x = 4$

$x = \tan^{-1}(4) = 76^\circ, 180 + 76$
 $= \underline{\underline{76^\circ, 256^\circ}}$



11. $4x^2 - 7x + 1 = 0$
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$a = 4$
 $b = -7$
 $c = 1$

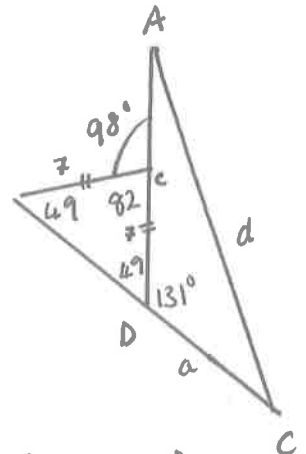
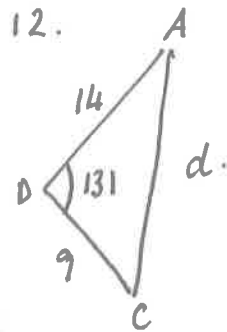
$= \frac{7 \pm \sqrt{49 - 4(4)(1)}}{8}$

$x = \frac{7 + \sqrt{33}}{8}$

$x = \frac{7 - \sqrt{33}}{8}$

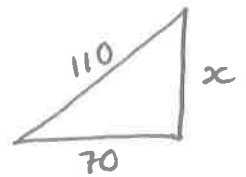
$x = 1.593...$
 $\underline{\underline{x = 1.6}}$

$x = 0.156...$
 $\underline{\underline{x = 0.2}}$



$d^2 = a^2 + c^2 - 2ac \cos D$
 $= 9^2 + 14^2 - 2(9)(14) \cos 131$
 $= 442.326...$
 $d = \sqrt{442.326}$
 $d = 21.031...$
 $\underline{\underline{d = 21.0 \text{ cm}}}$

13.
 $x^2 = 110^2 - 70^2$
 $= 7200$
 $x = \sqrt{7200}$
 $= 84.852...$
 $x = 84.9 \text{ mm}$
 $d = 110 - 84.9$
 $= \underline{\underline{25.1 \text{ mm}}}$



14.
 $\frac{\sin^2 A}{1 - \sin^2 A}$
 $= \frac{\sin^2 A}{\cos^2 A}$
 $= \underline{\underline{\tan^2 A}}$

$\sin^2 A + \cos^2 A = 1$
 $\cos^2 A = 1 - \sin^2 A$

$\frac{\sin A}{\cos A} = \tan A$

2012 Credit Paper 1

1. $7.2 - 0.161 \times 30$

$= 2.37$

$$\begin{array}{r} 1.61 \\ \times 3 \\ \hline 4.83 \end{array} \quad \begin{array}{r} 6 \quad 11 \\ 7.20 \\ - 4.83 \\ \hline 2.37 \end{array}$$

2. $(3x - 2)(2x^2 + x + 5)$

$= 6x^3 + 3x^2 + 15x - 4x^2 - 2x - 10$

$= 6x^3 - 2x^2 + 13x - 10$

3. $L = \frac{\sqrt{m}}{k}$

$kL = \sqrt{m}$

$m = (kL)^2$ or $m = k^2 L^2$

4. $p^2 = r^2 - q^2$

$= 12^2 - 10^2$

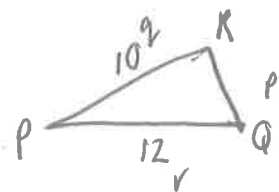
$= 144 - 100$

$= 44$

$p = \sqrt{44}$

$= \sqrt{4 \times 11}$

$= 2\sqrt{11}$



5. Last week: $\frac{18}{30}$

$= \frac{6}{10}$

$= 60\%$

This week $\frac{16}{25}$

$= \frac{64}{100}$

$= 64\%$

His scoring improved by 4%.

6a) roots: $x = -1$ and $x = 5$

Axis of symmetry at $x = 2$
(midpoint of roots)

b) When $x = 2$

$y = 5 + 4(2) - 2^2$

$= 5 + 8 - 4$

$= 9$

maximum at 9.

7. $a = 2$ $b = -2$ $c = -1$

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

$x = \frac{2 \pm \sqrt{4 - 4(2)(-1)}}{4}$

$x = \frac{2 \pm \sqrt{4 + 8}}{4}$

$x = \frac{2 + \sqrt{12}}{4}$

$x = \frac{2 - \sqrt{12}}{4}$

$x = \frac{2 + 2\sqrt{3}}{4}$

$x = \frac{2 - 2\sqrt{3}}{4}$

$x = \frac{1 + \sqrt{3}}{2}$

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

202 Credit Paper 1

$$8. \quad \begin{aligned} 2x - y &= 3 \quad \textcircled{1} \\ x + 2y &= 14 \quad \textcircled{2} \times 2 \end{aligned}$$

$$\begin{array}{r} 2x - y = 3 \\ - \quad 2x + 4y = 28 \quad - \\ \hline \end{array}$$

$$-5y = -25$$

$$\underline{y = 5}$$

Sub $y = 5$ into $\textcircled{1}$

$$2x - y = 3$$

$$2x - 5 = 3$$

$$2x = 8$$

$$\underline{x = 4}$$

$P(4, 5)$

$$9a) \quad T_m = \frac{D}{S}$$

$$= \frac{40}{x}$$

$$T_n = \frac{D}{S}$$

$$= \frac{40}{(x+5)}$$

$$T_m - T_n = \frac{40}{x} - \frac{40}{(x+5)}$$

$$= \frac{40(x+5) - 40x}{x(x+5)}$$

$$= \frac{40x + 200 - 40x}{x(x+5)}$$

$$= \underline{\underline{\frac{200}{x(x+5)}}}}$$

$$10a) \quad (2^3)^2 = 2^6$$

$$= 64$$

$$b) \quad (2^3)^n = \frac{1}{64}$$

$$2^{-6} = \frac{1}{64}$$

$$\underline{\underline{n = -2}}$$

$$11a) \quad \underbrace{2+4+6+8+10+12+14+16+18+20}_{10 \text{ terms}} \quad \uparrow$$

'n'

$$\therefore 10 \times 11 = \underline{\underline{110}}$$

$$b) \quad \frac{n}{2} \times \left(\frac{n}{2} + 1\right)$$

$$= \underline{\underline{\frac{n}{2} \left(\frac{n}{2} + 1\right)}}$$

c) as sequence begins at 10!
Subtract $(2+4+6+8) = 20$

$$\frac{n}{2} \left(\frac{n}{2} + 1\right) - 20$$

$$= \frac{100}{2} \left(\frac{100}{2} + 1\right) - 20$$

$$= 50 \times 51 - 20$$

$$= 2550 - 20$$

$$= \underline{\underline{2530}}$$

$$\begin{array}{r} 51 \\ \times 5 \\ \hline 255 \times 10 \\ \hline = 2550 \end{array}$$

Credit 2012 Paper 2

$$\begin{aligned}
 1. \quad & 2690000 \times (1.04)^3 \\
 & = \cancel{80801000} \\
 & = 3025884.16 \\
 & = 3030000 \\
 & = 3.03 \text{ million vehicles.}
 \end{aligned}$$

$$2a) \quad Q_1 = 23, \quad Q_2 = \cancel{23.9}, \quad Q_3 = 51$$

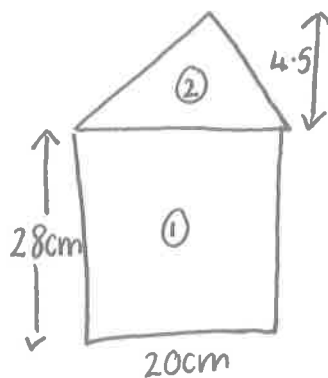
$$\begin{aligned}
 \text{SIQR} &= \frac{Q_3 - Q_1}{2} \\
 &= \frac{51 - 23}{2} \\
 &= \frac{28}{2} \\
 &= \underline{\underline{14}}
 \end{aligned}$$

- b) • Range smaller after training
 • SIQR smaller after training
 ∴ It can be suggested athletes performance is now more consistent.

$$\begin{aligned}
 3. \quad A_1 &= l \times b \\
 &= 20 \times 28 \\
 &= \underline{\underline{560 \text{ cm}^2}}
 \end{aligned}$$

$$\begin{aligned}
 A_2 &= \frac{1}{2} b h \\
 &= 20 \times 4.5 \div 2 \\
 &= \underline{\underline{45 \text{ cm}^2}}
 \end{aligned}$$

$$\begin{aligned}
 \text{Total area} &= 560 + 45 \\
 &= \underline{\underline{605 \text{ cm}^2}}
 \end{aligned}$$



$$\begin{aligned}
 V &= A \times \text{length} \\
 &= 605 \times 9 \\
 &= 5445 \text{ cm}^3 \\
 &= 5445 \text{ ml} \\
 &= 5.445 \text{ L} \Rightarrow \underline{\underline{5 \text{ L}}}
 \end{aligned}$$

$$\begin{aligned}
 4. \quad \text{Arc Length} &= \frac{2C}{360} \times \pi \times 4.6 \\
 &= \frac{65}{360} \times \pi \times 4.6 \\
 &= 2.609\dots \\
 &= \underline{\underline{2.6 \text{ m}}}
 \end{aligned}$$

5. No longer in course.

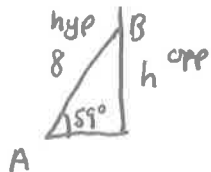
$$\begin{aligned}
 6. \quad 104\% &= 894.40 \\
 1\% &= 894.40 \div 104 \\
 &= 8.6 \\
 100\% &= 8.6 \times 100 \\
 &= \underline{\underline{860}}
 \end{aligned}$$

7.

$$\sin x = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 59^\circ = \frac{h}{8}$$

$$\begin{aligned}
 h &= 8 \sin 59^\circ \\
 h &= 6.857\dots \\
 h &= \underline{\underline{6.9 \text{ m}}}
 \end{aligned}$$



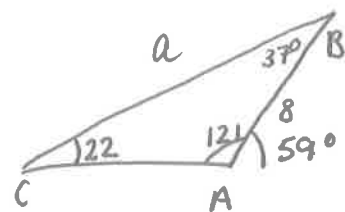
$$\frac{a}{\sin A} = \frac{c}{\sin C}$$

$$\frac{a}{\sin 121} = \frac{8}{\sin 22}$$

$$a = \frac{8 \sin 121}{\sin 22}$$

$$a = 18.305\dots$$

$$a = \underline{\underline{18.3 \text{ m}}}$$



$$8. \text{ Scale factor (large)} = \frac{4}{0.8}$$

$$= \frac{40}{8}$$

$$= \underline{\underline{5}}$$

$$\text{Scale factor (area)} = 5^2 = 25$$

$$\text{Area of bead} = 25 \times 0.6$$

$$= \underline{\underline{15 \text{ cm}^2}}$$

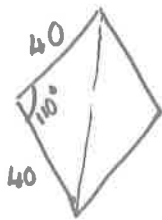
9.

$$\text{Area} = \frac{1}{2} ab \sin C$$

$$= \frac{1}{2} (40)(40) \sin 110^\circ$$

$$= 751.754 \dots$$

$$= 751.8 \text{ cm}^2$$



$$\text{Area rhombus} = 2 \times 751.8$$

$$= \underline{\underline{1503.6 \text{ cm}^2}}$$

10. $C = 1.8$ from graph

$$A(0, 1.8) \quad B(4, 6.6)$$

$$m = \frac{y_A - y_B}{x_A - x_B}$$

$$= \frac{1.8 - 6.6}{0 - 4}$$

$$= \frac{-4.8}{-4}$$

$$= \underline{\underline{1.2}}$$

$$y = mx + c$$

$$f = md + c$$

$$f = \underline{\underline{1.2d + 1.8}}$$

$$10b) f = 1.2d + 1.8$$

$$f = 1.2(7) + 1.8$$

$$= 10.2$$

$$\Rightarrow \text{fare} = \underline{\underline{\pounds 10.20}}$$

11a)

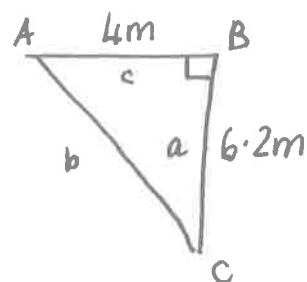
$$b^2 = a^2 + c^2$$

$$= 6.2^2 + 4^2$$

$$= 54.44$$

$$b = \sqrt{54.44}$$

$$b = \underline{\underline{7.4 \text{ m}}}$$



b)

$$\cos D = \frac{a^2 + c^2 - d^2}{2ac}$$

$$= \frac{7^2 + 5^2 - 7.4^2}{2(7)(5)}$$

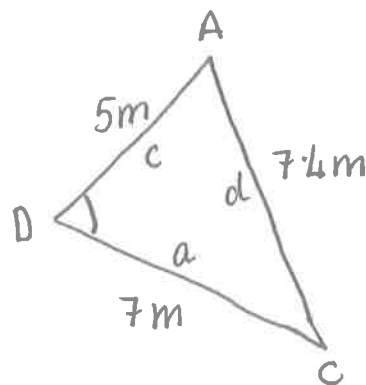
$$= \frac{19.56}{70}$$

$$\cos D = \frac{19.56}{70}$$

$$D = \cos^{-1}(19.56 \div 70)$$

$$= 73.773 \dots$$

$$= \underline{\underline{73.8^\circ}} \Rightarrow \underline{\underline{\angle ADC = 73.8^\circ}}$$



$$12a) f(x) = 3 \sin x$$

$$f(270) = 3 \sin 270$$

$$= \underline{\underline{-3}}$$

2012 Credit Paper 2

$$12b) f(t) = 0.6$$

$$3 \sin t = 0.6$$

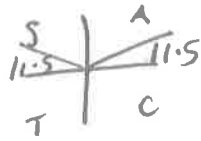
$$\sin t = \frac{0.6}{3}$$

$$\sin t = 0.2$$

$$t = \sin^{-1}(0.2)$$

$$t = 11.5^\circ, 180 - 11.5^\circ$$

$$= \underline{\underline{11.5^\circ, 168.5^\circ}}$$



$$13a) 5U = 3PR$$

$$\therefore (x^2 + 5) = 6x$$

$$\therefore x^2 - 6x + 5 = 0$$

$$b) x^2 - 6x + 5 = 0$$

$$(x - 5)(x - 1) = 0$$

either $x = 5$ or $x = 1$

$$PR > QR \quad \begin{array}{l} \backslash PR \\ \text{QR} = 10 \end{array} \quad \begin{array}{l} \backslash PR \\ \text{QR} = 2 \end{array}$$

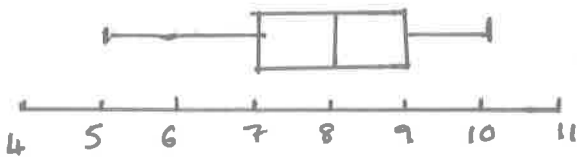
$$\Rightarrow \underline{\underline{x = 1}}$$

1. £ 1 158 000 000 000

2a. Cumulative Frequency

2
7
13
24
33
35

b) $Q_1 = 7$ $Q_2 = 8$ $Q_3 = 9$



3a) $4x + 3y = 36$

$$3y = -4x + 36$$

$$y = \frac{-4}{3}x + 12$$

$A = (0, 12)$

b) at ~~non~~ $y = 8$,

$$4x + 24 = 36$$

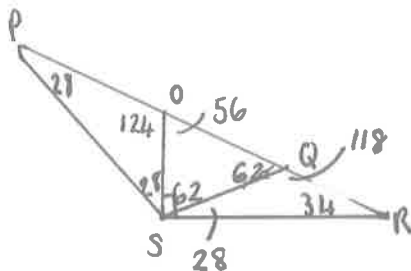
$$4x = 12$$

$$\underline{\underline{x = 3}}$$

$C(3, 8)$

4)

$\angle QRS = 34^\circ$



5). Mean: $100800 \div 5 = 20160$

median: 10300

The mean is higher than 4 of the 5 values, and so the median is more representative.

6a) $(x-2)(x-4) = 0$
 $x = 2$ or $x = 4$.

b) On y axis, $x = 0$

$$y = x^2 - 6x + 8$$

$$y = 0 - 6(0) + 8$$

$$y = 8.$$

$A(0, 8)$, $B(2, 0)$, $C(4, 0)$.

c) $x^2 - 6x + 8$

$$(x-3)^2 - 1$$

$$(x-3)^2$$

$$x^2 - 6x + 9$$

TP: (3, -1)

$x = 3$

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

$$20 = \frac{1}{2} (a)(16) \left(\frac{1}{4}\right)$$

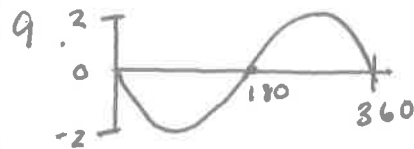
$$20 = \frac{16a}{8}$$

$$20 = 2a$$

$a = 10$

8a) $(a+b)(a+b) = (a+b)^2$

b) $(94+6)(94+6) = 100^2$
 $= 10000$



10. $\sqrt{2}(\sqrt{3} + \sqrt{2}) - \sqrt{6}$

$$= \sqrt{6} + \sqrt{4} - \sqrt{6}$$

$$= \sqrt{4}$$

$= 2$

2012 Int 2 Paper 2.

1. Arc length = $\frac{110}{360} \times \pi \times d$

= $\frac{110}{360} \times 40.8$

= 12.466...

= 12.5cm

2. $(3x-5)(x^2+2x-6)$

= $3x^3 + 6x^2 - 18x - 5x^2 - 10x + 30$

= $3x^3 + x^2 - 28x + 30$

3. $V_{\text{sphere}} = \frac{4}{3} \pi r^3$

= $\frac{4}{3} \pi 4^3$

= 268.082...

= 268.10m³

$V_{\text{cyl}} = \pi r^2 h$

= $\pi \times 4^2 \times 15$

= 753.982...

= 754.00m³

Total Volume = 1022.10m³

= 1022mm

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

a = 3

b = 7

c = -5

$x = \frac{-7 \pm \sqrt{49 - 4(3)(-5)}}{2 \times 3}$

$x = \frac{-7 + \sqrt{109}}{6}$

$x = \frac{-7 - \sqrt{109}}{6}$

x = 0.573...

x = -2.906...

x = 0.6

x = -2.9

5a)	x	x - \bar{x}	(x - \bar{x}) ²
	134	18	324
	102	-14	196
	127	11	121
	98	-18	324
	104	-12	144
	131	15	225
			<u>1334</u>

$\bar{x} = \frac{696}{6} = 116$

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

= $\sqrt{\frac{1334}{5}}$

= 16.334...

= 16.3

b) 1 and 4.

① The mean is the same and so the total scores are the same.

② Std deviation of second is lower so first matches are more spread out.

6a) $6x + 2y = 3148$

$5x + 3y = 3022$

$18x + 6y = 9444$

$- 10x + 6y = 6044$

$8x = 3400$

$x = 425$

$5(425) + 3y = 3022$

$3y = 3022 - 2125$

$3y = 897$

$y = 299$

$2(425) + 4(299) = 2046$

Over charged by £10.

2012 Int2 Paper 2

7. $\frac{a}{b} + \frac{b}{a}$

$= \frac{a^2}{ab} + \frac{b^2}{ab}$

$= \frac{a^2 + b^2}{ab}$

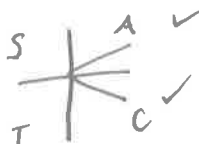
8. $5 \cos x - 3 = 1$

$5 \cos x = 4$

$\cos x = 4/5$

$x = \cos^{-1}(4/5)$

$= \underline{\underline{36.9^\circ \text{ and } 323.1^\circ}}$



9. $E = \frac{I}{D^2}$

$D^2 E = I$

$D^2 = \frac{I}{E}$

$D = \underline{\underline{\sqrt{\frac{I}{E}}}}$

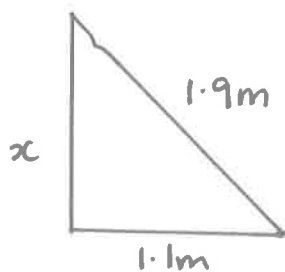
10. $x^2 = 1.9^2 - 1.1^2$

$= 2.4$

$x = \sqrt{2.4}$

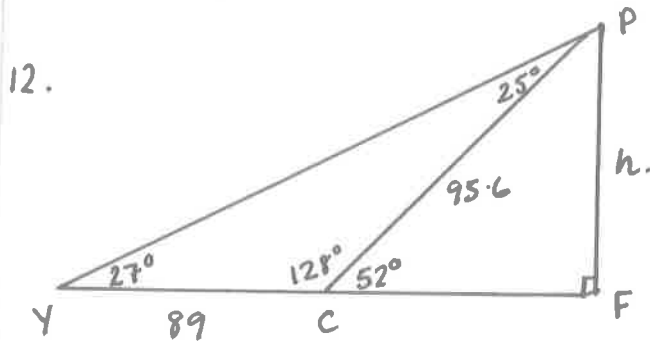
$x = 1.549 \dots$

$x = \underline{\underline{1.5 \text{ m}}}$



Depth = $1.9 - 1.5 = \underline{\underline{0.4 \text{ m}}}$

11. $\frac{x^2 y^4}{x^3 y^6} = \frac{x^2 y^4 x^3}{y^6} = \frac{x^5}{y^2}$



$\frac{C}{\sin C} = \frac{y}{\sin Y} = \frac{P}{\sin P}$

$\frac{y}{\sin 27} = \frac{89}{\sin 25}$

$y = \frac{89 \sin 27}{\sin 25}$

$= 95.606 \dots$

$= \underline{\underline{95.6 \text{ m}}}$

$\sin x = \frac{\text{opp}}{\text{hyp}}$

$\sin 52 = \frac{h}{95.6}$

$h = 95.6 \sin 52$

$= 75.333 \dots$

$= \underline{\underline{75.3 \text{ m}}}$

13. $0.85^4 = 0.522$

After 40 years, 52.2% remains
and 80

14. $\tan x = \frac{\sin x}{\cos x} \therefore \frac{\cos x \tan x}{\sin x} = \frac{\cos x \sin x}{\sin x \cos x} = \underline{\underline{1}}$

2013 Credit Paper 1

$$1. 86.5 - 3.651 \times 20 = 13.48$$

$$\begin{array}{r} 36.51 \\ \times 2 \\ \hline 73.02 \end{array}$$

$$\begin{array}{r} 86.50 \\ - 73.02 \\ \hline 13.48 \end{array}$$

$$2. \frac{1}{2} \div 2\frac{2}{3}$$

$$= \frac{1}{2} \div \frac{8}{3}$$

$$= \frac{1}{2} \times \frac{3}{8}$$

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

3. The mean dropped from 20.8 to 9.6 suggesting the course had a positive effect.

• The standard deviation increased from 8.5 to 12.0 indicating greater variation.

$$4. A = 4\pi r^2$$

$$\frac{A}{4\pi} = r^2$$

$$r = \sqrt{\frac{A}{4\pi}}$$

$$5a) p(\text{male} \neq 7,60) = \frac{12}{150} = \frac{2}{25}$$

$$b) p(\leq 5) = \frac{7}{150}$$

$$6a) 2g + 5s = 125 \quad \textcircled{1}$$

$$b) 4g + 3s = 145 \quad \textcircled{2}$$

c) multiply $\textcircled{1}$ by 2.

$$4g + 10s = 250$$

$$- \quad 4g + 3s = 145 \quad -$$

$$7s = 105$$

$$s = 15$$

Sub $s = 15$ into $\textcircled{1}$

$$2g + 5(15) = 125$$

$$2g + 75 = 125$$

$$2g = 50$$

$$g = 25$$

gold = £25, silver = £15.

$$7a) (2x-5)(x^2+3x-7)$$

$$= 2x^3 + 6x^2 - 14x - 5x^2 - 15x + 35$$

$$= 2x^3 + x^2 - 29x + 35$$

$$b) 4x - 5 \leq 7x - 20$$

$$15 \leq 3x$$

$$5 \leq x$$

$$x \geq 5$$

$$8. 2x + y = 3.$$

$$y = -2x + 3.$$

negative grad

(B and D)

positive y-intercept
(A and C)

\therefore Graph D = $2x + y = 3$.

2013 Credit Paper 1

$$\begin{aligned} 9a) \quad 12 \times 50p &= £6 \\ 4 \times 35p &= £1.40 \\ CD &= £4.25 \\ \hline \text{Total} & \quad \underline{\underline{£11.65}} \end{aligned}$$

$$\begin{aligned} b) \quad C &= 0.35(x-12) + 6 + 4.25 \\ &= 0.35x - 4.20 + 6 + 4.25 \\ C &= \underline{\underline{0.35x + 6.05}} \end{aligned}$$

$$\begin{aligned} 10a) \quad \text{on } x \text{ axis, } y &= 0 \\ \therefore x^2 - 2x - 3 &= 0 \\ (x-3)(x+1) &= 0 \\ x &= 3 \text{ or } x = -1 \\ A(-1, 0) \text{ and } B(3, 0) \end{aligned}$$

b) Axis of symmetry:

method 1: halfway between -1 and 3
 $x = 1$

$$\begin{aligned} \text{method 2: } x^2 - 2x - 3 &= 0 \\ (x-1)^2 - 4 & \quad (x-1)^2 \\ TP = (1, -4) & \quad = x^2 - 2x + 1 \end{aligned}$$

axis of symmetry: $x = 1$

$$11a) \quad 9^2 - 8 \times 10 = 1$$

$$\begin{aligned} b) \quad (n+1)^2 - n(n+2) \\ &= n^2 + 2n + 1 - n^2 - 2n \\ &= \underline{\underline{1}} \end{aligned}$$

2013 Credit Paper 2

1. $D = 3000 \text{ km}$
 $= 3000000 \text{ m}$

$$S = \frac{D}{T} \text{ m/s}$$

$$T = 16 \text{ days}$$

$$T = 16 \times 24 \times 60 \times 60$$

$$T = 1382400 \text{ seconds}$$

$$S = \frac{3000000}{1382400}$$

$$= 0.00217$$

$$= 2.17 \times 10^{-3} \text{ m/s}$$

2. $a = 2$ $b = 7$ $c = -3$

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

$$x = \frac{-7 \pm \sqrt{49 - 4(2)(-3)}}{2 \times 2}$$

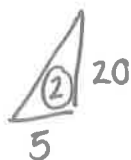
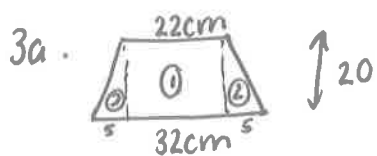
$$x = \frac{-7 \pm \sqrt{49 + 24}}{4}$$

$$x = \frac{-7 + \sqrt{73}}{4}$$

$$x = \frac{-7 - \sqrt{73}}{4}$$

$$\underline{\underline{x = 0.4}}$$

$$x = \underline{\underline{-3.9}}$$



$$A_1 = 22 \times 20$$
$$= 440 \text{ cm}^2$$

$$\text{Total Area} = 440$$
$$+ 100$$
$$\underline{\underline{540 \text{ cm}^2}}$$

$$A_2 = 5 \times 20$$
$$= 100 \text{ cm}^2$$

b) $V = A \times h$ or $V = A \times l$

$$V = 540 \times 60$$
$$= 32400 \text{ cm}^3$$

4. $92\% = 1296$

$$1\% = 1296 \div 92$$

$$= 18$$

$$100\% = 1800$$

$$\underline{\underline{28\% = 504}}$$

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

$$9 = \frac{1}{2} (x)(x) \sin 30$$

$$9 = \frac{1}{2} (x^2) \frac{1}{2}$$

$$9 = \frac{1}{4} x^2$$

$$36 = x^2$$

$$\underline{\underline{x = 6 \text{ cm}}}$$

6. $r^2 = 19^2 - 18 \cdot 2^2$

$$= 361 - 331.24$$

$$r^2 = 29.76$$

$$r = \sqrt{29.76}$$

$$\underline{\underline{r = 5.46 \text{ m}}}$$

$$C = \pi d$$

$$C = \pi \times 10.92$$

$$= 34.306 \dots$$

$$= \underline{\underline{34.3 \text{ m}}}$$

7. Jan: $0.93 \times 94 = 87.42$

$$\text{Feb: } (0.93)^2 \times 94 = 81.3$$

$$\text{March: } (0.93)^3 \times 94 = 75.6$$

$$\text{April: } (0.93)^4 \times 94 = 70.3$$

During April.

2013 Credit Paper 2

8. Arc length = $\frac{x^\circ}{360} \times \pi \times d$.

$$\frac{360 \times AL}{\pi d} = x^\circ$$

$$x^\circ = \frac{360 \times 36.7}{\pi \times 100}$$

$$= 42.055 \dots$$

$$\underline{x^\circ = 42.1^\circ}$$

9.

$$\frac{g}{\sin 4} = \frac{t}{\sin 11}$$

$$\frac{g}{\sin 123} = \frac{46}{\sin 25}$$

$$g = \frac{46 \sin 123}{\sin 25}$$

$$g = 91.285 \dots$$

$$\underline{g = 91.3 \text{ m}}$$

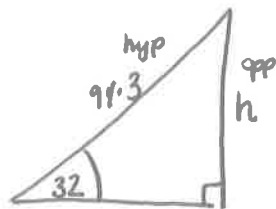
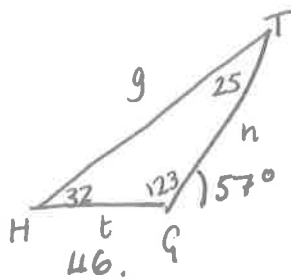
$$\sin x = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 32 = \frac{h}{91.3}$$

$$h = 91.3 \sin 32$$

$$h = 48.381 \dots$$

$$\underline{h = 48.4 \text{ m}}$$



10a) $f(x) = 4 \times 2^x$
 $f(3) = 4 \times 2^3$
 $= 4 \times 8$
 $= \underline{\underline{32}}$

b) $f(m) = 4$

$$4 \times 2^m = 4$$

$$2^m = \frac{4}{4}$$

$$2^m = 1$$

$$\underline{\underline{m = 0}}$$

11a)

$$x^2 = 30^2 - 27.5^2$$

$$= 900 - 756.25$$

$$= 143.75$$

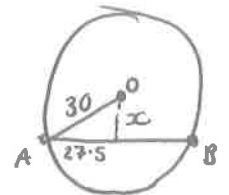
$$x = \sqrt{143.75}$$

$$x = 12.0 \text{ cm to 1dp}$$

$$\text{Depth} = 30 - 12 = 18 \text{ cm}$$

b) $60 - 18 = 42 \text{ cm}$

(water is 18 cm from top).

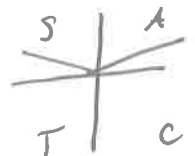


12. $1 + \sin x^\circ = 1.7$

$$\sin x^\circ = 0.7$$

$$x = \sin^{-1}(0.7)$$

$$= 44.4^\circ$$



$$x_a = 44.4^\circ, \quad x_b = 135.6^\circ$$

13. width = 35 cm

$$S.F = \frac{35}{25} = \frac{7}{5}$$

$$\text{Card length} = \frac{7}{5} \times 40$$

$$= 56 \text{ cm.}$$

$$56 = 40 + 5 + x$$

$$\underline{x = 11 \text{ cm}}$$

14. $a^2 = b^2 + c^2 - 2bc \cos A$
 $(2x)^2 = x^2 + 6^2 - 2x(6)(0.5)$
 $4x^2 = 3x^2 + 36 - 6x$
 $0 = 3x^2 - 6x - 36$
 $0 = x^2 + 2x - 20$.

2013 Int 2 Paper 1

1. $6ab - 7bc$
 $\underline{\underline{b(6a - 7c)}}$

2. $m_{AB} = \frac{y_A - y_B}{x_A - x_B}$
 $= \frac{4 - 0}{0 - 3}$
 $= \underline{\underline{-\frac{4}{3}}}$

$y - b = m(x - a)$

$y - 0 = -\frac{4}{3}(x - 3)$

$y = \underline{\underline{-\frac{4}{3}x + 4}}$

3. $\text{Arc} = \frac{x}{360} \times 3.14 \times d.$
 $= \frac{72}{360} \times 3.14 \times 10$
 $= \frac{72}{36} \times 3.14$
 $= 2 \times 3.14$
 $= \underline{\underline{6.28 \text{ cm}}}$

4. $2x - y = 10 \times 5.$
 $4x + 5y = 6$

$10x - 5y = 50$
 $\ast 4x + 5y = 6$

 $14x = 56$
 $\underline{\underline{x = 4}}$

$2(4) - y = 10$
 $-y = 10 - 8$
 $\underline{\underline{y = -2}}$

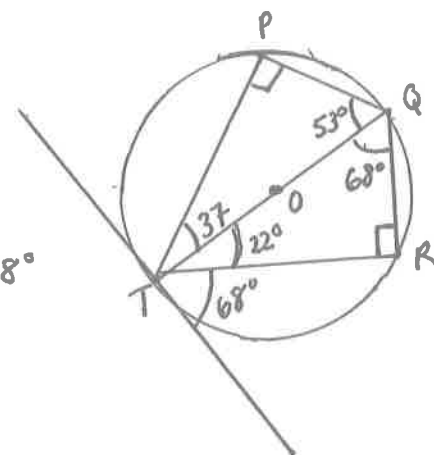
$A = (0, 4)$

$B = (3, 0)$

$C = 4.$

or \downarrow
 $y = \underline{\underline{-\frac{4}{3}x + 4.}}$

5.



$PQR = 53^\circ + 68^\circ$
 $= \underline{\underline{121^\circ}}$

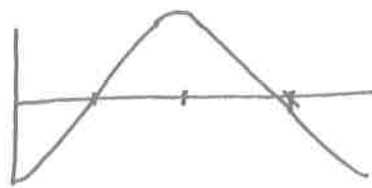
6. No longer in course.

7. $\frac{(x+4)^2}{x^2 - x - 20}$
 $= \frac{(x+4)^2}{(x-5)(x+4)}$
 $= \underline{\underline{\frac{x+4}{x-5}}}$

8. $y = \sin 2x$
 2: twice in 360
 $= \underline{\underline{180^\circ}}$

9. $y = 20 - (x-4)^2$
 $T_p = (4, 20)$

10. $y = \sin(x - 90)^\circ$



$y = \sin(x - 90)^\circ$

2013 Int2 Paper 2

1. $(x+2)(x-5) - 9x$
 $= x^2 - 5x + 2x - 10 - 9x$
 $= x^2 - 3x - 9x - 10$
 $= \underline{\underline{x^2 - 12x - 10}}$

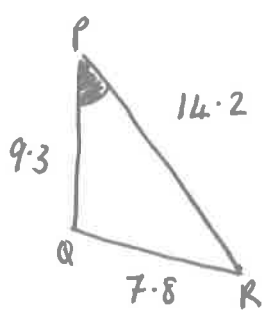
2. $1,750,000 \times 0.8 = 600,000$
 $2. 750,000 \times 0.8^2 = 480,000$
 $3. 750,000 \times 0.8^3 = 384,000$
 $4. 750,000 \times 0.8^4 = 307,200$

$\frac{1}{2}$ of 750k = 375,000

Replacement due in year 4.

3. SNP = $0.35 \times 360 = 126^\circ$
 Lab = $0.3 \times 360 = 108^\circ$
 Libdem = $0.15 \times 360 = 54^\circ$
 Cons = $0.1 \times 360 = 36^\circ$
 Other = 36° .

4. $\cos P = \frac{q^2 + r^2 - p^2}{2qr}$
 $= \frac{14.2^2 + 9.3^2 - 7.8^2}{2(9.8)(14.2)}$
 $= 0.816...$



$P = \cos^{-1}(0.816...)$
 $P = 35.249...$
 $P = \underline{\underline{35.2^\circ}}$

5. $a=1$
 $b=-5$
 $c=-2$
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{5 \pm \sqrt{25 - 4(-2)(1)}}{2}$

$x = \frac{5 + \sqrt{33}}{2}$ $x = \frac{5 - \sqrt{33}}{2}$

$x = 5.372...$ $x = 0.372...$
 $\underline{\underline{x = 5.4}}$ $\underline{\underline{x = 0.4}}$

6a) $\bar{x} = \frac{410}{5} = 82$

x	$x - \bar{x}$	$(x - \bar{x})^2$
84	2	4
78	-4	16
87	5	25
80	-2	4
81	-1	1
		<hr/>
		50

$S = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$
 $= \sqrt{\frac{50}{4}}$
 $= \underline{\underline{3.5}}$

b) $\bar{x} = \frac{407 + 510}{5} = 102.$

x	$x - \bar{x}$	$(x - \bar{x})^2$
104	2	4
98	-4	16
107	5	25
100	-2	4
101	-1	1
		<hr/>
		50

$S = \sqrt{\frac{50}{4}} = 3.53... = \underline{\underline{3.54}}$

7. $V_{\text{cube}} = 10^3$
 $= \underline{1000 \text{ cm}^3}$

$V \text{ after loss} = 1000 \times 0.92$
 $= \underline{920 \text{ cm}^3}$

$V_{\text{cone}} = \frac{1}{3} \pi r^2 h$

$920 = \frac{1}{3} \pi 8^2 \times h$

$h = \frac{3 \times 920}{8^2 \pi}$

$h = 13.727 \dots$

$h = 13.7 \text{ cm}$

$h = 13 \text{ cm (2 sf)}$

8. $a = 3b^2 + c$

$a - c = 3b^2$

$b^2 = \frac{a - c}{3}$

$b = \underline{\underline{\sqrt{\frac{a - c}{3}}}}$

9. $\frac{x^6}{y^2} \times \frac{y^3}{x^3}$

$= \frac{x^6 y^3}{x^3 y^2}$

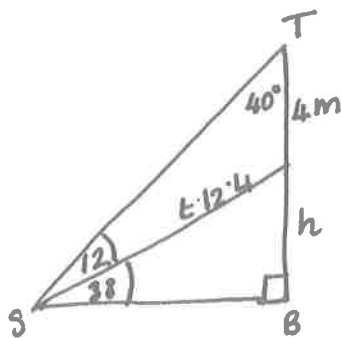
$= \underline{\underline{x^3 y}}$

10.

$\frac{t}{\sin 40} = \frac{4}{\sin 12}$

$t = \frac{4 \sin 40}{\sin 12}$

$= \underline{\underline{12.4 \text{ (1 dp)}}}$



$\sin 38 = \frac{h}{12.4}$

$h = 12.4 \sin 38$

$= 7.634$

$\underline{\underline{CB = 7.6 \text{ m}}}$

11. $\frac{3}{x+2} + \frac{5}{x-1}$

$\frac{3(x-1) + 5(x+2)}{(x+2)(x-1)}$

$= \frac{3x - 3 + 5x + 10}{(x+2)(x-1)}$

$= \frac{8x + 7}{(x+2)(x-1)}$

12.

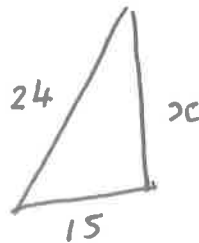
$x^2 = 24^2 - 15^2$

$= 351$

$x = \sqrt{351}$

$x = 18.734 \dots$

$x = 18.7 \text{ to 1 dp.}$



$PQ = 24 + 24 + 18.7 + 18.7$
 $= \underline{\underline{84.8 \text{ cm}}}$

13. $h = 7 + 5 \sin t$
 $10.8 = 7 + 5 \sin t$

$5 \sin t = 3.8$

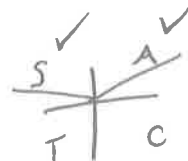
$\sin t = \frac{3.8}{5}$

$t = \sin^{-1} \left(\frac{3.8}{5} \right)$

$= 49.464 \dots$

$= 49.5^\circ, 180 - 49.5$

$= \underline{\underline{49.5^\circ, 130.5^\circ}}$



$\therefore \underline{\underline{49.5 \text{ seconds and } 130.5 \text{ seconds}}}$

2014 National 5 Paper 1

1. $\frac{5}{12} \times 2\frac{2}{9}$

$= \frac{5}{\frac{12}{3}} \times \frac{20}{9}$

$= \frac{25}{27}$

2. $(2x-5)(3x+1)$

$= 6x^2 + 2x - 15x - 5$

$= \underline{6x^2 - 13x - 5}$

3. $x^2 - 14x + 49$

$= \underline{(x-7)^2 - 5} \quad (x-7)^2$
 $= x^2 - 14x + 49$

4. $2\underline{y} = \begin{pmatrix} -4 \\ 6 \\ 10 \end{pmatrix} \quad \underline{y} = \begin{pmatrix} 0 \\ -4 \\ 3 \end{pmatrix}$

$2\underline{y} - \underline{y} = \begin{pmatrix} -4 \\ 10 \\ 3 \end{pmatrix}$

5. $\frac{L}{\sin L} = \frac{m}{\sin M} = \frac{k}{\sin K}$

$\frac{18}{0.9} = \frac{LM}{0.4}$

$0.9LM = 0.4 \times 18$

$LM = \frac{0.4 \times 18}{0.9}$

$= \frac{7.2}{0.9} = \underline{8 \text{ cm}}$

6a) A(5, 200) B(25, 500)

$m_{AB} = \frac{y_A - y_B}{x_A - x_B}$

$= \frac{200 - 500}{5 - 25} = \frac{-300}{-20} = \underline{15}$

$y = 15x + c$

When $x = 5$, $y = 200$

$200 = 15(5) + c$

$200 = 75 + c$

$\underline{c = 125}$

$y = 15x + 125$

$\underline{c = 15F + 125}$

b) $c = 15 \times 40 + 125$

$= 600 + 125$

$= \underline{725 \text{ calories}}$

7. $y = ax^2$

at $(-3, 45)$

$45 = a(-3)^2$

$45 = a \times 9$

$a = \frac{45}{9}$

$\underline{a = 5}$

$y = 5x^2$

8. $\sqrt{40} + 4\sqrt{10} + \sqrt{90}$

$= \sqrt{4}\sqrt{10} + 4\sqrt{10} + \sqrt{9}\sqrt{10}$

$= 2\sqrt{10} + 4\sqrt{10} + 3\sqrt{10}$

$= 9\sqrt{10}$

9. $80\% = 480000$

$10\% = 480000 \div 8$

$= 6000$

$100\% = 600000$

10. $a = 3$, $b = 40$

$\underline{y = 3 \sin(x + 40)^\circ}$

2014 National 5 Paper 2

11 a) $4x + 3y = 12$

$$3y = -4x + 12$$

$$y = -\frac{4}{3}x + 4$$

$$\text{gradient} = \underline{\underline{-\frac{4}{3}}}$$

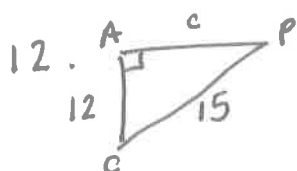
b) $4x + 3y = 12$

on x axis, $y = 0$

$$4x + 0 = 12$$

$$\underline{x = 3}$$

$$\underline{\underline{(3, 0)}}$$



$$AP^2 = 15^2 - 12^2$$

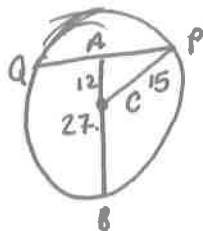
$$= 225 - 144$$

$$= 81$$

$$AP = \sqrt{81}$$

$$= 9 \text{ cm}$$

$$PQ = 9 \times 2 = \underline{\underline{18 \text{ cm}}}$$



13 a) $16t - t^2 = 60$

$$0 = t^2 - 16t + 60$$

$$0 = (t - 10)(t - 6)$$

$$t = 10 \text{ or } t = 6$$

First: after 6 seconds.

$$t^2 - 16t + 70$$

b) $a = 1, b = -16, c = 70$

$$b^2 - 4ac$$

$$= 256 - 4(1)(70)$$

$$= -24$$

$b^2 - 4ac < 0$ ∴ no real roots \Rightarrow Will not reach 70m.

2014 National 5 Paper 2

1. $964 \times 0.85^3 = 590.02$
 $= 590$ to nearest 10.

2. B (8.4, 10) C (4, 0.10)

3a. $05a + 3c = 158.25$ (x2)

b. $3a + 2c = 98.00$ (x3)

c. $10a + 6c = 316.50$

$- 9a + 6c = 294.00$ -

$$a = 22.50$$

Sub $a = 22.50$ into ①

$5(22.50) + 3c = 158.25$

$$3c = 158.25 - 112.50$$

$$3c = 45.75$$

$$c = 15.25$$

Adult = £22.50, Child = £15.25

4a) $\bar{x} = \frac{53 + 57 + 58 + 60 + 55 + 56}{6}$
 $= 56.5$

ii) x	$x - \bar{x}$	$(x - \bar{x})^2$
53	-3.5	12.25
55	-1.5	2.25
56	-0.5	0.25
57	0.5	0.25
58	1.5	2.25
60	3.5	12.25
		<hr/> + 12.25
		<hr/> 29.50

$$S = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$$
$$= \sqrt{\frac{29.50}{5}}$$
$$= 2.43$$

b) No because the standard dev is higher.

5. Scale factor = $\left(\frac{8}{5}\right)^3$

$$\text{Volume} = \left(\frac{8}{5}\right)^3 \times 750$$

$$= 3072 \text{ cm}^3$$

6. If north, Midtown is 090° .

$$85^2 + 75^2$$

$$110^2 = 12100$$

$$= 7225 + 5625$$

$$= 12850$$

$$85^2 + 75^2 \neq 110^2$$

Since $a^2 \neq b^2 + c^2 \therefore$ not right angled. \therefore not directly north.

7. $V_{\text{cone}} = \frac{1}{3} \pi r^2 h$

$$= \frac{1}{3} \pi \times 4^2 \times 15$$

$$= 251.32 \text{ cm}^3$$

$$V_{\text{heml}} = \frac{1}{2} \left(\frac{4}{3} \pi r^3\right)$$

$$= \frac{4}{6} \pi \times 3.7^3$$

$$= 106.08 \text{ cm}^3$$

$$V_{\text{glass}} = 251.32 - 106.08$$

$$= 145.24$$

$$= 150 \text{ to 2 sig figs.}$$

8. $\frac{n^5 \times 10n^7}{2n^2}$

$$= \frac{10n^6}{2n^2}$$

$$= 5n^4$$

2014 National 5 paper 2.

$$9. \frac{7}{x+5} - \frac{3}{x}$$

$$= \frac{7x}{x(x+5)} - \frac{3(x+5)}{x(x+5)}$$

$$= \frac{7x - 3x - 15}{x(x+5)}$$

$$= \frac{4x - 15}{x(x+5)}$$

$$10a) \cos B = \frac{8^2 + 11^2 - 13^2}{2 \times 8 \times 11}$$

$$B = \cos^{-1}(0.09)$$

$$B = \underline{\underline{84.8^\circ}}$$

$$11. s = ut + \frac{1}{2}at^2$$

$$s - ut = \frac{1}{2}at^2$$

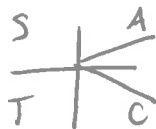
$$2(s - ut) = at^2$$

$$a = \frac{2(s - ut)}{t^2}$$

$$12. 11 \cos x - 2 = 3$$

$$11 \cos x = 5$$

$$\cos x = \frac{5}{11}$$



$$x = \cos^{-1}(5 \div 11)$$

$$x = 62.964 \dots$$

$$x^\circ = 63.0^\circ, 360 - 63$$

$$x^\circ = \underline{\underline{63^\circ, 297^\circ}}$$

$$13. \text{Area Sector} = \frac{310}{360} \times \pi \times 7^2$$

$$= 132.557 \dots$$

$$= 132.6 \text{ m}^2$$

$$\text{Area of triangle} = \frac{1}{2} ab \sin C$$

$$= \frac{1}{2} (7)(7) \sin 50^\circ$$

$$= 18.78 \dots$$

$$= 18.8 \text{ m}^2$$

$$\text{Total area} = 132.6 + 18.8$$

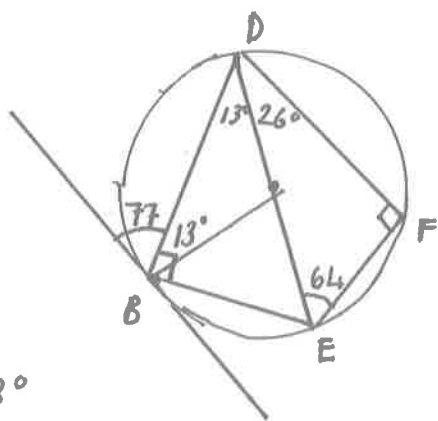
$$= \underline{\underline{151.4 \text{ m}^2}}$$

2015 National 5 Paper 1.

1. $6\frac{1}{3} - 2\frac{1}{3}$
 $= \frac{1}{3} - \frac{1}{3}$ $6-2=4$
 $= \frac{3}{15} - \frac{5}{15}$
 $= -\frac{2}{15}$
 $\Rightarrow 4 - \frac{2}{15}$
 $= \underline{\underline{3\frac{13}{15}}}$

2. $11 - 2(1 + 3x) < 39$
 $-2 - 6x < 28$
 $-6x < 30$
 $-x < 5$
 $x > -5$

3.
 $180 - (90 + 64)$
 $= 180 - 154$
 $= 180 - 26154$
 $= \underline{\underline{26^\circ}}$



$\angle BDF = 26^\circ + 13^\circ$
 $= \underline{\underline{39^\circ}}$

4. $(x-4)(x^2+x-2)$
 $= x^3 + x^2 - 2x - 4x^2 - 4x + 8$
 $= x^3 - 3x^2 - 6x + 8$

5. $\bar{x} = \frac{15}{5} = 3$ $s = \sqrt{\frac{32}{4}}$

x	$x - \bar{x}$	$(x - \bar{x})^2$	$s = \sqrt{8}$
1	-2	4	$\therefore \underline{\underline{a=8}}$
2	-1	1	
2	-1	1	
2	-1	1	
8	5	25	

6. $y = a \sin bx$

• min/max is $-4/4$
 $\therefore \underline{a=4}$

• Graph occurs 3 times in 360°
 $\therefore \underline{b=3}$

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

$a = -2, b = -4$

axis of symmetry $x = -2$

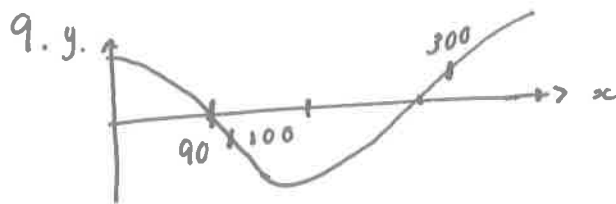
8. $m_{AB} = \frac{y_A - y_B}{x_A - x_B}$ $A(-2, 5)$
 $B(3, 15)$
 $= \frac{5 - 15}{-2 - 3}$
 $= \frac{-10}{-5}$
 $= \underline{\underline{2}}$

$y - b = m(x - a)$ at $(-2, 5)$

$y - 5 = 2(x + 2)$

$y - 5 = 2x + 4$

$y = \underline{\underline{2x + 9}}$



From graph: $\cos 90 = 0$
 $\cos 100 = \text{negative}$
 $\cos 300 = \text{positive}$

$\therefore \underline{\underline{\cos 100^\circ, \cos 90^\circ, \cos 300^\circ}}$

10. 12 16 (17) 18 18 | 21 22 (26)
 27 27

$$\text{Median} = \frac{18+21}{2} = \frac{39}{2} = \underline{\underline{19.5}}$$

$$Q_1 = \underline{\underline{17}} \quad Q_3 = \underline{\underline{26}}$$

$$\text{SIQR} = \frac{26-17}{2} = \frac{9}{2} = \underline{\underline{4.5}}$$

- On average 2nd round scores were higher.
- SIQR lower, less variation in 2nd round.

11. $3x + 2y = 17 \quad (\times 2)$
 $2x + 5y = 4 \quad (\times 3)$

$$\begin{array}{r} 6x + 4y = 34 \\ - 6x + 15y = 12 \\ \hline -11y = 22 \\ y = \underline{\underline{-2}} \end{array}$$

$$\begin{aligned} 3x + 2(-2) &= 17 \\ 3x &= 17 + 4 \\ 3x &= 21 \\ x &= \underline{\underline{7}} \end{aligned}$$

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

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

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

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

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

$$= \frac{\sqrt{4 \times 2}}{2}$$

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

$$= \underline{\underline{\sqrt{2}}}$$

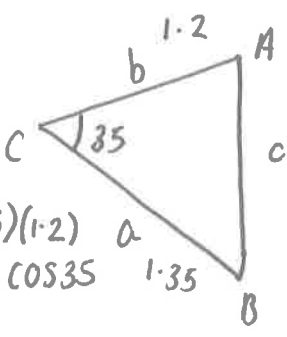
14. $8^{5/3}$
 $= \sqrt[3]{8^5}$
 $= 2^5$
 $= \underline{\underline{32}}$

2015 National 5 Paper 2

1. $240\,000 \times 1.028^2$
 $= \underline{\underline{£253\,628.16}}$

2. $f(x) = 3x + 2$
 $f(a) = 3a + 2 = 23$
 $3a = 21$
 $a = \underline{\underline{7}}$

3. $C^2 = a^2 + b^2 - 2ab \cos c$
 $= (1.2)^2 + (1.35)^2 - 2(1.35)(1.2) \cos 35$
 $= 0.608 \dots$
 $C = \sqrt{0.608 \dots}$
 $= 0.779 \dots$
 $= \underline{\underline{0.8 \text{ km}}}$



4. $|u| = \sqrt{6^2 + (-13)^2 + (18)^2}$
 $= \underline{\underline{23}}$

5. $\underline{p} = \begin{pmatrix} -5 \\ 3 \end{pmatrix}$ $\underline{q} = \begin{pmatrix} 4 \\ -5 \end{pmatrix}$
 $\underline{p} + \underline{q} = \begin{pmatrix} -5 \\ 3 \end{pmatrix} + \begin{pmatrix} 4 \\ -5 \end{pmatrix}$
 $= \underline{\underline{\begin{pmatrix} -1 \\ -2 \end{pmatrix}}}$

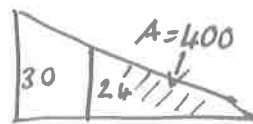
6a) $V = \frac{4}{3} \pi (6400)^3$
 $= \underline{\underline{1.1 \times 10^{12} \text{ km}^3}}$

b) $= 1.1 \times 10^{12} \div 2.2 \times 10^{10}$
 $= \underline{\underline{50}}$

7. $\frac{5t}{s} \div \frac{t}{28^2}$
 $= \frac{5t}{s} \times \frac{28^2}{t}$
 $= \frac{10s^2t}{st}$
 $= \underline{\underline{10s}}$

8. $85\% = 297.50$
 $1\% = 297.50 \div 85$
 $= 3.50$
 $100\% = \underline{\underline{£350}}$

9. $SF = \frac{30}{24} = \frac{5}{4}$



$SF(\text{Area}) = \left(\frac{5}{4}\right)^2 \times 400$
 $= 625 \text{ cm}^3$

$A_{\text{pats}} = 625 - 400$
 $= \underline{\underline{225 \text{ cm}^3}}$

10. Arc length $= \frac{x}{360} \times \pi \times 2r$

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

$360 \times 28.4 = 65 \times \pi \times 2r$

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

$r = 25.033 \dots$

$r = \underline{\underline{25.0 \text{ cm}}}$

1. $\frac{1}{2}p + q$
 $\frac{1}{2} \begin{pmatrix} 4 \\ -6 \end{pmatrix} + \begin{pmatrix} -5 \\ -1 \end{pmatrix}$
 $\begin{pmatrix} 2 \\ -3 \end{pmatrix} + \begin{pmatrix} -5 \\ -1 \end{pmatrix}$
 $= \underline{\underline{\begin{pmatrix} -3 \\ -4 \end{pmatrix}}}$

2. $\frac{3}{4} \left(\frac{1}{3} + \frac{2}{7} \right)$
 $\frac{3}{4} \left(\frac{7}{21} + \frac{6}{21} \right)$
 $\frac{3}{4} \left(\frac{13}{21} \right)$
 $= \frac{39}{84}$
 $= \frac{13}{28}$

3. A.O.S = $\frac{45}{360} \times \pi \times 20^2$
 $= \frac{1}{8} \times \pi \times 400$ $\left\{ \begin{array}{l} \frac{1}{8} \text{ of } 400 \\ = 50 \end{array} \right.$
 $= 50 \times 3.14$
 $= \underline{\underline{157 \text{ cm}^2}}$

4.a) $2c + 3d = 9.6$

b) $3c + 4d = 13.3$

c) $2c + 3d = 9.6 \quad (\times 3)$
 $3c + 4d = 13.3 \quad (\times 2)$
 $\begin{array}{r} 6c + 9d = 28.8 \\ - 6c + 8d = 26.6 \\ \hline d = 2.2 \end{array}$

Sub $d = 2.2$ into
 $2c + 3d = 9.6$
 $2c + 3(2.2) = 9.6$
 $2c + 6.6 = 9.6$
 $2c = 3$
 $c = \frac{3}{2}$ or 1.5

dress = 2.2 m² cloak = 1.5 m²
 $D = (3, 100)$
 $E = (15, 340)$

5a)
 $m = \frac{y_E - y_D}{x_E - x_D}$
 $= \frac{340 - 100}{15 - 3}$
 $= \frac{240}{12}$
 $= \underline{\underline{20}}$

x : Age (A)
 y : weight (W)

at (3, 100)
 $y - b = m(x - a)$
 $y - 100 = 20(x - 3)$
 $y - 100 = 20x - 60$
 $y = 20x + 40$
 $\therefore \underline{\underline{W = 20A + 40}}$

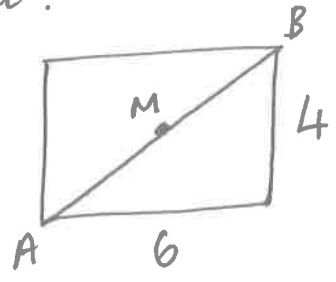
b) 1 year = 12 months
 $W = 20(12) + 40$
 $= 240 + 40$
 $= \underline{\underline{280 \text{ kg}}}$

6. $b^2 - 4ac$ $a = 7$
 $25 - 4(7)(-1)$ $b = 5$
 $25 - (-28)$ $c = -1$
 $25 + 28$ $b^2 - 4ac > 0$
 $= 53$ \therefore 2 real distinct roots.

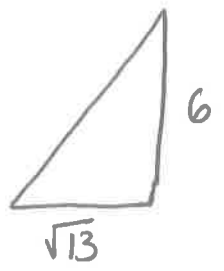
7a) (8, 4, 0)

b) Face diagonal!

$$\begin{aligned}
 AB &= \sqrt{6^2 + 4^2} \\
 &= \sqrt{36 + 16} \\
 &= \sqrt{52} \\
 &= \sqrt{4 \times 13} \\
 &= 2\sqrt{13} \Rightarrow AM = \sqrt{13} \\
 &\quad \text{(half of diagonal)}
 \end{aligned}$$



$$\begin{aligned}
 AV &= \sqrt{(\sqrt{13})^2 + 6^2} \\
 &= \sqrt{13 + 36} \\
 &= \sqrt{49} \\
 &= \underline{\underline{7}}
 \end{aligned}$$



8. $\frac{2x}{3} - \frac{5}{6} = 2x$ (multiply by 6)

$$\frac{6 \times 2x}{3} - \frac{6 \times 5}{6} = 6 \times 2x$$

$$\frac{12x}{3} - \frac{30}{6} = 12x \quad \text{(simplify)}$$

$$4x - 5 = 12x \quad +5 \quad +5$$

$$4x = 12x + 5 \quad -12x \quad -12x$$

$$-8x = 5$$

$$x = \underline{\underline{-\frac{5}{8}}}$$

9. $f(x) = \frac{2}{\sqrt{x}}$

$$f(5) = \frac{2}{\sqrt{5}}$$

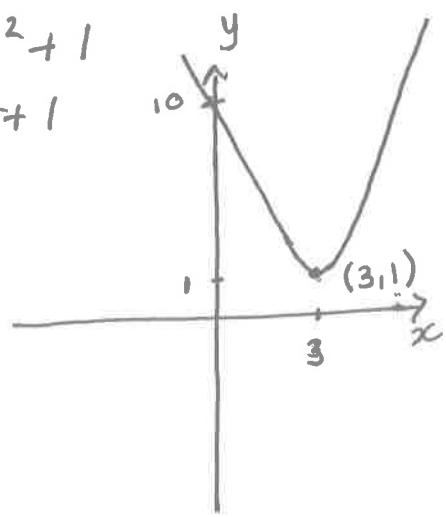
$$\frac{2}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \underline{\underline{\frac{2\sqrt{5}}{5}}}$$

10.

TP at (3, 1)

on y axis, $x = 0$

$$\begin{aligned}
 \therefore y &= (0 - 3)^2 + 1 \\
 y &= (-3)^2 + 1 \\
 y &= 9 + 1 \\
 y &= 10
 \end{aligned}$$



11. as $\tan^2 x = \frac{\sin^2 x}{\cos^2 x}$

$$\tan^2 x \cos^2 x$$

$$= \frac{\sin^2 x}{\cos^2 x} \times \frac{\cos^2 x}{1}$$

$$= \frac{\sin^2 x \cos^2 x}{\cos^2 x}$$

$$= \underline{\underline{\sin^2 x}}$$

N5 2016 Paper 1 Ctd

12a) $A_r = L \times b$
 $= (2x+1)(x+8)$
 $= 2x^2 + 16x + 2x + 8$
 $= \underline{\underline{2x^2 + 17x + 8}}$

b) $A_t = \frac{1}{2}(b \times h)$
 $= \frac{1}{2} \times 2(x+5) \times 3x$
 $= (x+5) \times 3x$
 $= 3x^2 + 15x$

as $A_t = A_r$

$3x^2 + 15x = 2x^2 + 17x + 8$
 $-2x^2 \quad -2x^2$

$x^2 + 15x = 17x + 8$
 $-17x \quad -17x$

$x^2 - 2x = 8$

$\therefore \underline{\underline{x^2 - 2x - 8 = 0}}$

c) Solve for x :

$x^2 - 2x - 8 = 0$

$(x-4)(x+2) = 0$

$x = 4$ or ~~$x = -2$~~

As height of triangle cannot be negative ($3x-2 = -6$) disregard ~~-2~~ .

length = $4+8 = 12$ cm

breadth = $2(4)+1 = 9$ cm.

N5 2016 Paper 2

1. $100 - 8 = 92\% \Rightarrow 0.92$

35×0.92^3

$= 27.254 \dots$

$= \underline{\underline{27 \text{ grams}}}$

2. $12 \div (1.5 \times 10^9) = \underline{\underline{8 \times 10^{-9} \text{ g}}}$

3. $\vec{B\bar{D}} = \underline{v} - \underline{u}$

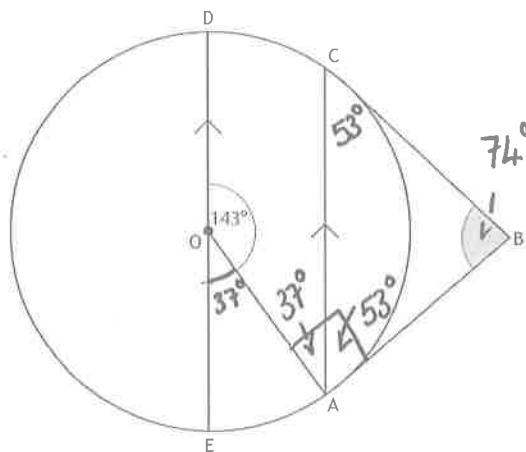
4. $3x^2 - 48$

$3(x^2 - 16)$

$\underline{\underline{3(x-4)(x+4)}}$

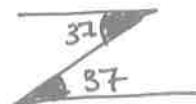
HCF \checkmark
 2 Sq \checkmark
 tri

5.



$\angle AOE: 180 - 143 = 37^\circ$

$\angle OAC$: Z shape in parallel lines



$\angle CAB: 90 - 37^\circ = 53^\circ$

$\angle ACB = \angle CAB = 53^\circ$

$\angle ABC = 180 - 53 - 53 = \underline{\underline{74^\circ}}$

6a $\bar{x} = (13+16+10+22+5+12) \div 6$

$\bar{x} = 13 \text{ mins}$

x	$x - \bar{x}$	$(x - \bar{x})^2$
13	0	0
16	3	9
10	-3	9
22	9	81
5	-8	64
12	-1	1

$\Sigma(x - \bar{x})^2 = 164$

$s = \sqrt{\frac{164}{5}}$

$= 5.727 \dots$

$= 5.7 \text{ mins.}$

b). On average, Sophie waits longer.

• Sophies waiting times were more consistent.

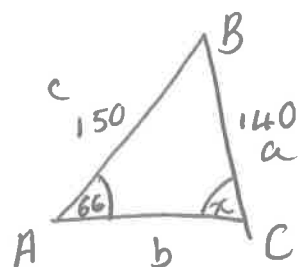
7. $V_{\text{large}} = \frac{1}{3} \pi (16^2) \times 24$
 $= 6433.98 \dots$

$V_{\text{small}} = \frac{1}{3} \pi (9^2) \times 13.5$
 $= 1145.11 \dots$

$V_{\text{large}} - V_{\text{small}} = 5288.87$

$V = 5300 \text{ cm}^3$

8.



$\frac{a}{\sin A} = \frac{c}{\sin C}$

$\frac{140}{\sin 66} \neq \frac{150}{\sin x}$

$140 \sin x = 150 \sin 66$

$\sin x = \frac{150 \sin 66}{140}$

$= 0.978 \dots$

$x = \sin^{-1}(0.978 \dots)$

$x = 78.2^\circ$

9. $x^2 + 8x - 7 = (x+4)^2 + b$

$(4^2 = 16)$

$16 - (-7) = 23$

$\therefore (x+4)^2 - 23$

10. $(n^2)^3 \times n^{-10}$

$= n^6 \times n^{-10}$

$= n^{(6-10)}$

$= n^{-4}$

$= \frac{1}{n^4}$

N5 Paper 2 2016 ctd

11. SF - reduction $\frac{60}{100}$

~~area~~

- area $(\frac{60}{100})^2$

$(\frac{60}{100})^2 \times 13.75$

= £4.95

12. $L = \sqrt{4kt - p}$

$L^2 = 4kt - p$

$L^2 + p = 4kt$

$\frac{L^2 + p}{4t} = k$

$\left. \begin{aligned} 4kt &= \\ 4t \times k & \end{aligned} \right\}$

13. $\frac{3}{x-2} + \frac{5}{x+1}$

$\frac{3(x+1)}{(x-2)(x+1)} + \frac{5(x-2)}{(x-2)(x+1)}$

$\frac{3x+3}{(x-2)(x+1)} + \frac{5x-10}{(x-2)(x+1)}$

$\frac{3x+3+5x-10}{(x-2)(x+1)}$

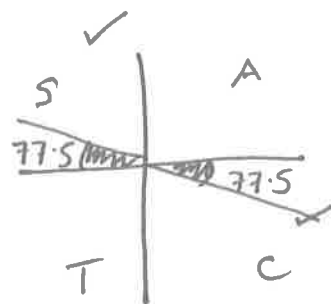
$\frac{8x-7}{(x-2)(x+1)}$

14.

$2 \tan x^\circ + 5 = -4$

$2 \tan x = -9$

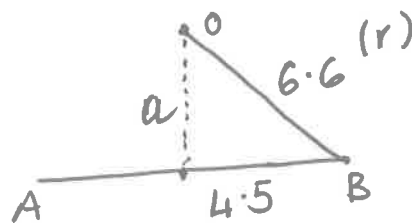
$\tan x = \frac{-9}{2}$



$\tan^{-1}(9 \div 2) = 77.47 \dots$
 $= 77.5$

$x = 180 - 77.5, 360 - 77.5$
 $= 102.5^\circ, 282.5^\circ$

15.

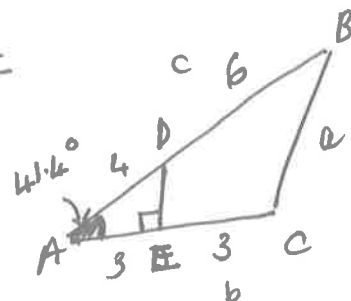


$a^2 = 6.6^2 - 4.5^2$

$a = \sqrt{6.6^2 - 4.5^2}$
 $= 4.8 \dots$

height = $a + r$
 $= 4.8 + 6.6$
 $= 11.4 \text{ cm}$

16. Find angle A



$\cos A = \frac{\text{adj}}{\text{hyp}} = \frac{3}{4}$

$A = \cos^{-1}(3 \div 4) = 41.4^\circ$

$a^2 = b^2 + c^2 - 2bc \cos A$
 $= 6^2 + 10^2 - 2(6)(10) \cos 41.4^\circ$

$a^2 = 46$

$a = 6.8 \text{ cm}$