2012 Credit Paper 1

1. $7.2 - 0.161 \times 30$

$= 2.37$

$$
\begin{array}{r}
1.61 \\
\times \quad 3 \\
\hline
4.83
\end{array}
$$

$$
\begin{array}{r}
{}^6 7.{}^{11}2\,0 \\
- \ 4.83 \\
\hline
2.37
\end{array}
$$

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

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

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

3. $L = \dfrac{\sqrt{m}}{K}$

$KL = \sqrt{m}$

$m = (KL)^2 \quad \text{or} \quad m = K^2 L^2$

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

$= 12^2 - 10^2$

$= 144 - 100$

$= 44$

$p = \sqrt{44}$

$= \sqrt{4 \times 11}$

$= 2\sqrt{11}$
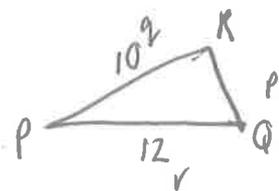
5. Last week: $\dfrac{18}{30}$ This week $\dfrac{16}{25}$

$= \dfrac{6}{10}$ $= \dfrac{64}{100}$

$= 60\%$ $= 64\%$

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. $a = 2 \quad b = -2 \quad c = -1$

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

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

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

$x = \dfrac{2 + \sqrt{12}}{4} \qquad x = \dfrac{2 - \sqrt{12}}{4}$

$x = \dfrac{2 + 2\sqrt{3}}{4} \qquad x = \dfrac{2 - 2\sqrt{3}}{4}$

$x = \dfrac{1 + \sqrt{3}}{2} \qquad x = \dfrac{1 - \sqrt{3}}{2}$

8. $2x - y = 3$ ①
     $x + 2y = 14$ ② $\times 2$

   $2x - y = 3$
$-$ $2x + 4y = 28$ $-$
   _____
   $-5y = -25$
   $y = 5$

Sub $y = 5$ into ①

   $2x - y = 3$
   $2x - 5 = 3$
   $2x = 8$
   $x = 4$ $P(4,5)$

9a) $T_m = \dfrac{D}{S}$ $T_{Tu} = \dfrac{D}{S}$

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

$T_m - T_{Tu} = \dfrac{40}{x} - \dfrac{40}{(x+5)}$

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

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

   $= \dfrac{200}{x(x+5)}$

10a) $(2^3)^2 = 2^6$
          $= 64$

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

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

   $n = -2$

11a) $2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20$
                  10 terms   'n'

   $\therefore 10 \times 11 = 110.$

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

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

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

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

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

   $= 50 \times 51 - 20$

   $= 2550 - 20$

   $= 2530$

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

1. $2\,690\,000 \times (1.04)^3$

   $= \cancel{3\,030\,0000}$

   $= 3\,025\,884.16$

   $= 3\,030\,000$

 $= 3.03$ million vehicles.

2a) $Q_1 = 23, \quad Q_2 = 39, \quad Q_3 = 51$

   $SIQR = \dfrac{Q_3 - Q_1}{2}$

   $= \dfrac{51-23}{2}$

   $= \dfrac{28}{2}$

   $= 14$

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

3. $A_1 = l \times b$

   $= 20 \times 28$

   $= 560 \text{cm}^2$

   $A_2 = \frac{1}{2} bh$

   $= 20 \times 4.5 \div 2$

   $= 45 \text{cm}^2$

   Total area $= 560 + 45$

   $= 605 \text{cm}^2$
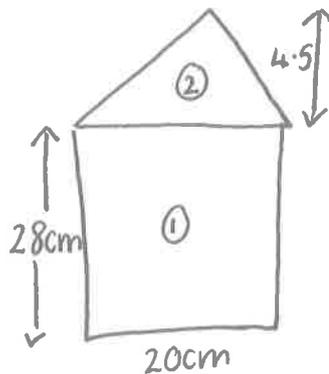
   $V = A \times \text{length}$

   $= 605 \times 9$

   $= 5445 \text{cm}^3$

   $= 5445 \text{ml}$

   $= 5.445 \text{L} \quad \Rightarrow \underline{5\text{L}}$

4. Arc Length $= \dfrac{x}{360} \times \pi \times 4.6$

   $= \dfrac{65}{360} \times \pi \times 4.6$

 $= 2.609\ldots$

   $= 2.6 \text{m}$

5. No longer in course.

6. $104\% = 894.40$

   $1\% = 894.40 \div 104$

   $= 8.6$

   $100\% = 8.6 \times 100$

   $= £860$

7. $\sin x = \dfrac{opp}{hyp}$

   $\sin 59° = \dfrac{h}{8}$

   $h = 8\sin 59$

   $h = 6.857\ldots$

   $h = 6.9 \text{m}$
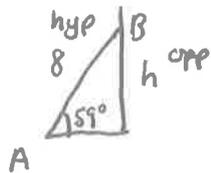
   $\dfrac{a}{\sin A} = \dfrac{c}{\sin C}$

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

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

   $a = 18.305\ldots$

   $a = 18.3 \text{m}$

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

$= \dfrac{40}{8}$

$= 5$
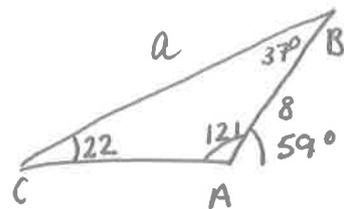
Scale factor $= 5^2$
(area) $= 25$.

Area of bead $= 25 \times 0.6$

$= 15 cm^2$

9.
Area $= \frac{1}{2} ab\sin C$
(tri)

$= \frac{1}{2}(40)(40)\sin 110°$

$= 751.754....$

$= 751.8 cm^2$
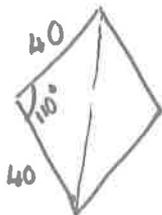
Area rhombus $= 2 \times 751.8$

$= 1503.6 cm^2$

10. $C = 1.8$ from graph

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

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

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

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

$= 1.2$

$y = mx + C$
$f = md + C$
$f = 1.2d + 1.8$

10b) $f = 1.2d + 1.8$

$f = 1.2(7) + 1.8$

$= 10.2$

$\Rightarrow$ fare $= £10.20$

11a)

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

$= 6.2^2 + 4^2$

$= 54.44$

$b = \sqrt{54.44}$

$b = 7.4 m$
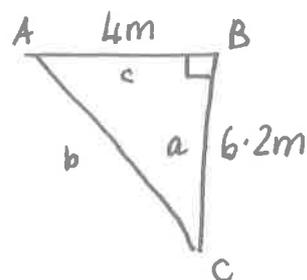
b)

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

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

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

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

$= 73.773....$

$= 73.8° \quad \Rightarrow \angle ADC = 73.8°$
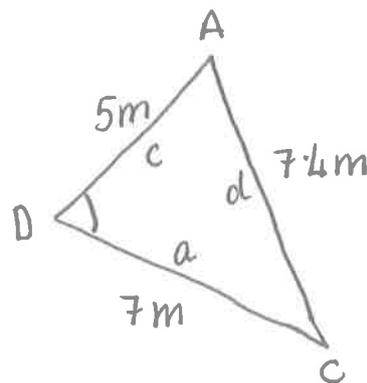
12a $f(x) = 3\sin x$

$f(270) = 3\sin 270$

$= -3$

12b) $f(t) = 0.6$

$3 \sin t = 0.6$

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

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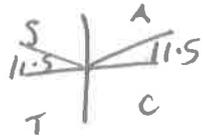
$t = \sin^{-1}(0.2)$

$t = 11.5°, \; 180 - 11.5°$

$= 11.5°, \; 168.5°$

S   A
11.5   11.5
T   C

13a) $SU = 3PR$

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

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

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

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

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

PR > QR   PR = 10   PR = 2

$\Rightarrow \underline{x = 1}$