2013 Credit Paper 1

1. $86.5 - 3.651 \times 20$

$= 13.48$

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

$$\begin{array}{r} 86.\overset{4}{5}0 \\ -73.02 \\ \hline 13.48 \end{array}$$

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

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

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

$= \dfrac{3}{16}$

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. $A = 4\pi r^2$

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

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

5a) $P(\text{male } \& \ 7.60) = \dfrac{12}{150}$

$= \dfrac{2}{25}$

b) $P(\leqslant 5) = \dfrac{7}{150}$

6a) $2g + 5s = 125$ ①

b) $4g + 3s = 145$ ②

c) multiply ① by 2.

$4g + 10s = 250$

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

$\overline{\qquad\qquad\qquad}$

$7s = 105$

$s = 15$

Sub $s = 15$ into 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) $4x - 5 \leqslant 7x - 20$

$15 \leqslant 3x$

$5 \leqslant x$

$x \geqslant 5$

8. $2x + y = 3$.

$y = -2x + 3$.

negative grad
(B and D)

positive y-intercept
(A and D)

∴ Graph D $= 2x + y = 3$.

9a) $12 \times 50p = £6$

$\quad 4 \times 35p = £1.40$

$\quad\quad CD = £4.25$

$\quad\quad$ Total $\quad £11.65$

b) $C = 0.35(x-12) + 6 + 4.25$

$\quad = 0.35x - 4.20 + 6 + 4.25$

$C = 0.35x + 6.05$

10a) on x axis, $y=0$

$\therefore\ x^2 - 2x - 3 = 0$

$\quad (x-3)(x+1) = 0$

$\quad x = 3\ $ or $\ x = -1$

$\quad A(-1,0)$ and $B(3,0)$

b) Axis of symmetry:

method 1: halfway between -1 and 3

$\quad\quad x = 1$

method 2: $x^2 - 2x - 3 = 0$

$\quad (x-1)^2 - 4 \quad\quad\quad (x-1)^2$

$\quad TP = (1,-4) \quad\quad = x^2 - 2x + 1$

$\quad$ axis of symmetry: $x = 1$

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

b) $(n+1)^2 - n(n+2)$

$\quad = n^2 + 2n + 1 - n^2 - 2n$

$\quad = 1$

1. $D = 3$ km
   $= 3000$ m

   $T = 16$ days
   $T = 16 \times 24 \times 60 \times 60$
   $T = 1382400$ seconds

   $S = \dfrac{D}{T}$ m/s

   $S = \dfrac{3000}{1382400}$

   $= 0.00217$

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

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

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

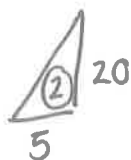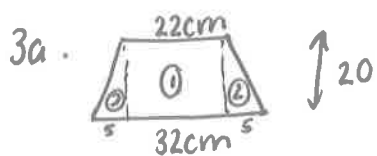 $x = \dfrac{-7 \pm \sqrt{49 - 4(2)(-3)}}{2 \times 2}$

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

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

   $x = 0.4 \qquad\qquad x = -3.9$

3a.

   22 cm
   20
   32 cm
   5

   20
   2
   5

   $A\textcircled{1} = 22 \times 20$
   $= 440$ cm^2

   $A_2 = \dfrac{5}{2} \times 20$
   $= 200$ cm^2

   Total Area $= 440$
   $ + 100$
   $ 540$ cm^2

   b) $V = A \times h$ or $V = A \times l$
   $V = 540 \times 60$
   $= 32400$ cm^3

4. $92\% = 1296$
   $1\% = 1296 \div 92$
   $= 18$
   $100\% = 1800$
   $28\% = 504$

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

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

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

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

   $36 = x^2$

   $x = 6$ cm

6. $r^2 = 19^2 - 18.2^2$
   $= 361 - 331.24$
   $r^2 = 29.76$
   $r = \sqrt{29.76}$
   $r = 5.46$ m

   $C = \pi d$
   $C = \pi \times 10.92$
   $= 34.306 \ldots$
   $= 34.3$ m

7. Jan: $0.93 \times 94 = 87.42$
   Feb: $(0.93)^2 \times 94 = 81.3$
   March: $(0.93)^3 \times 94 = 75.6$
   April: $(0.93)^4 \times 94 = 70.3$
   During April.

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

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

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

$$= 42.055\ldots$$

$$x^\circ = 42.1^\circ$$

9.

$$\dfrac{g}{\sin G} = \dfrac{t}{\sin T}$$

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

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

$$g = 91.285\ldots$$

$$g = 91.3\,m$$

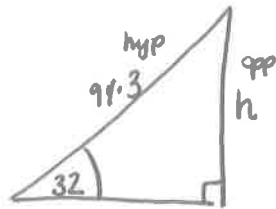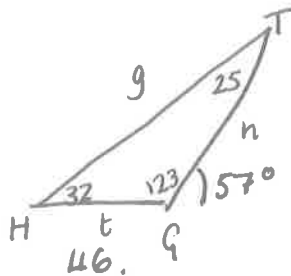$$\sin x = \dfrac{opp}{hyp}$$

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

$$h = 91.3 \sin 32$$

$$h = 48.381\ldots$$

$$h = 48.4\,m$$

10a) $f(x) = 4 \times 2^x$

$$f(3) = 4 \times 2^3$$

$$= 4 \times 8$$

$$= 32$$

b) $f(m) = 4$

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

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

$$2^m = 1$$

$$m = 0$$

11a)

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

$$= 900 - 756.25$$

$$= 143.75$$

$$x = \sqrt{143.75}$$
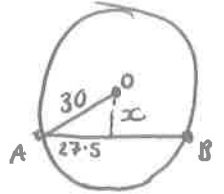
$$x = 12.0\,cm \text{ to 1dp}$$

$$Depth = 30 - 12 = 18\,cm$$

b) $60 - 18 = 42\,cm$
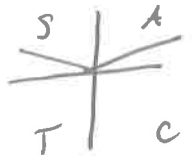
   (water is 18cm from top).

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 = 35cm

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

Card length $= \dfrac{7}{5} \times 40$

$$= 56\,cm.$$

$$56 = 40 + 5 + x$$

$$x = 11\,cm$$

14. $a^2 = b^2 + c^2 - 2bc \cos A$

$$(2x)^2 = x^2 + 6^2 - 2x(6)(0.5)$$

$$4x^2 = 3x^2 + 36 - 6x$$

$$0 = 3x^2 + 6x - 36$$

$$0 = x^2 + 2x - 20.$$