CREDIT 2007 – Paper I

1. $6.04 + 3.72 \times 20$

$6.04 + 74.40$

80.44

$$\begin{array}{r} 3.72 \\ \times \quad 2 \\ \hline 7.44 \end{array} \qquad \begin{array}{r} 7.44 \\ \times \ 10 \\ \hline 74.4 \end{array}$$

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2. $3\frac{1}{6} + 1\frac{2}{3}$ *Add whole numbers first*

$4 + \frac{1}{6} + \frac{2}{3}$ *use common denominator of 6*

$\rightarrow \ 4 + \frac{1}{6} + \frac{4}{6} \ \rightarrow \ 4 + \frac{5}{6} \ \rightarrow \ 4\frac{5}{6}$

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3. Probability $\frac{5}{8} \rightarrow \frac{5}{8}$ of audience are male.

So number of males in audience is:

$\frac{5}{8} \times \frac{400}{1} = \frac{5}{\cancel{8}^{1}} \times \frac{\cancel{400}^{50}}{1} = 250$ males.

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4. $P = \dfrac{2(m-4)}{3}$. Change subject to *m*.

Get rid of fraction - multiply both sides by 3.

$3P = 2(m-4)$ now remove brackets.

$3P = 2m - 8$ and add 8 to both sides.

$3P + 8 = 2m$ now divide both sides by 2

$m = \dfrac{3P+8}{2}$ *or* $m = \dfrac{1}{2}(3P+8)$

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5. Remove the brackets and simplify

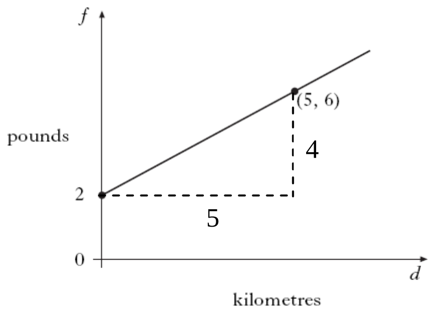
$(2x+3)^2 - 3(x^2-6)$

$\rightarrow \ (2x+3)(2x+3) - 3x^2 + 18$

$\rightarrow \ 4x^2 + 6x + 6x + 9 - 3x^2 + 18$

$\rightarrow \ x^2 + 12x + 27$

6.



$y = mx + c \ \rightarrow \ f = md + c$

$c = 2$ (*y*-intercept) gradient $m = \dfrac{rise}{run} = \dfrac{4}{5}$

Hence: $\rightarrow \ f = \dfrac{4}{5}d + 2$

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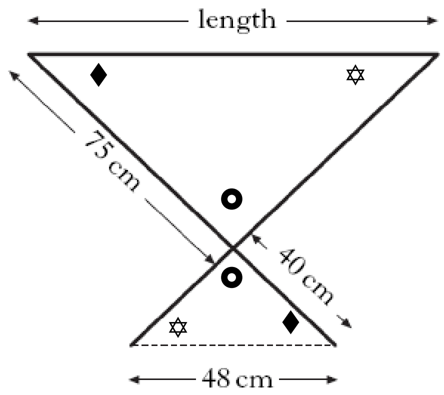
7. Remove brackets and simplify

$a^{\frac{1}{2}}\left(a^{\frac{1}{2}} - 2\right) \ \rightarrow \ a^{\frac{1}{2}} \times a^{\frac{1}{2}} - 2a^{\frac{1}{2}} = a - 2a^{\frac{1}{2}}$

(to multiply – add the indices)

8.



The two triangles are similar,
so the sides will have the same scale factor.

Marked angles are equal:
♦ (alternate angles)
✡ (alternate angles)
⭘ (vertically opposite angles)

So: 75 cm side corresponds to the 40 cm side

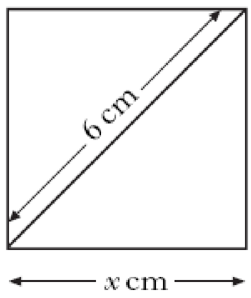
Enlargement Scale factor is: $\dfrac{75}{40} \rightarrow \dfrac{15}{8}$

Apply this to the side 48 cm
to find length of top.

$\rightarrow \ \dfrac{15}{8} \times \dfrac{48}{1} \rightarrow \dfrac{15}{\cancel{8}^{1}} \times \dfrac{\cancel{48}^{6}}{1} = 90$ cm

Yes the board meets his requirements.

9.



This is a square, so corners are 90°.

By Pythagoras:

$6^2 = x^2 + x^2$

$\rightarrow \ 36 = 2x^2 \ \rightarrow \ 18 = x^2$

$\rightarrow \ x = \sqrt{18} \ \rightarrow \ x = \sqrt{9 \times 2}$

$\rightarrow \ x = \sqrt{9} \times \sqrt{2} \ \rightarrow \ x = 3\sqrt{2}$

10. $T = \dfrac{k}{L^3}$

If L is doubled, then replace L with $2L$

$T = \dfrac{k}{(2L)^3}$ remove bracket $\rightarrow$ $T = \dfrac{k}{8L^3}$

Hence the effect on T is to divide it by 8.

11a) $x + y = 300$ ...... (1)

b) $4x + 6y = 1380$ ...... (2)

c) Solve simultaneously
Multiply (1) by 4
In order to eliminate the x variable.

$4x + 4y = 1200$ ...... (3)

$4x + 6y = 1380$ ...... (2)

Subtract (2) - (3)

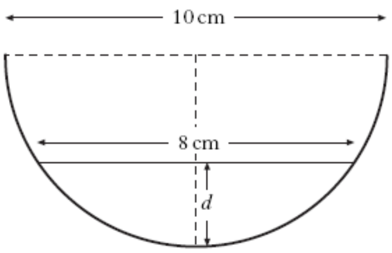
$2y = 180$ so, $y = 90$

Substitute back into (1)

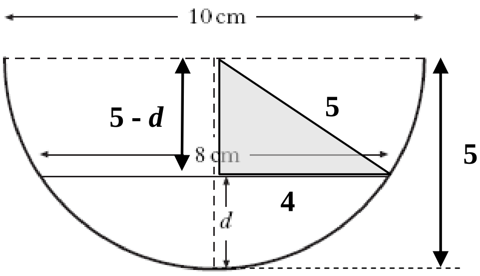
$x + 90 = 300$ so, $x = 210$

There are 210 standard seats
and 90 deluxe seats.

12.



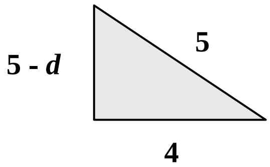
Guttering is semi circle, so diameter is 10 cm.
Radius of guttering is 5 cm.
Draw in the radius on diagram below.
Mark in the right angled triangle as shown.



Lower edge of triangle is 4 cm *(half of 8 cm)*
Height of triangle: $5 - d$ cm *(radius of gutter is 5)*

12. (continued)

Now extract the triangle



By Pythagoras:

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

$25 = (5-d)(5-d) + 16$

$25 = 25 - 5d - 5d + d^2 + 16$

$25 = 41 - 10d + d^2$ rearrange to normal form

$\rightarrow d^2 - 10d + 16 = 0$ factorise

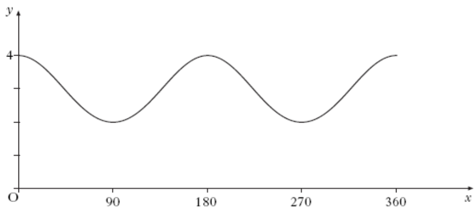
$\rightarrow (d-2)(d-8) = 0$

Hence $d = 2$ *or* $d = 8$

Discard $d = 8$ because this is not possible.
Gutter is only 5 cm deep.

So, depth of water in the gutter is 2 cm

13.



$y = \cos bx° + c$

The centre of the wave is at $y = 3$
There are 2 complete waves in 360°

Hence: $b = 2$ and $c = 3$

14a) The **sum** S_n of the first n terms of a sequence.

$S_n = 3^n - 1$

Hence sum of first two terms is: S_2

$S_2 = 3^2 - 1 = 9 - 1 = 8$

Sum of first two terms is 8.

b) If $S_n = 80$

$80 = 3^n - 1$

$81 = 3^n$

81 can be written as 9×9 *or* $3 \times 3 \times 3 \times 3 = 3^4$

So $3^4 = 3^n \Rightarrow n = 4$

END OF QUESTION PAPER