**CREDIT 2005 – Paper I**

1. $3.8 - (7.36 \div 8)$

$3.8 - 0.92$

$2.88$

$$8 \overline{)7.36} = 0.92$$

$$3.80 - 0.92 = 2.88$$

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2. $2\frac{1}{3} + \frac{5}{6}$ of $1\frac{2}{5}$ BODMAS – 'of' first

Change to improper fraction $\frac{7}{3} + \frac{5}{6}$ of $\frac{7}{5}$

remember: 'of' means '×'

$\rightarrow \frac{7}{3} + \frac{5}{6} \times \frac{7}{5} \quad \rightarrow \frac{7}{3} + \frac{\cancel{5}^{1}}{6} \times \frac{7}{\cancel{5}^{1}}$

$\rightarrow \frac{7}{3} + \frac{7}{6}$ use common denominator of 6

$\rightarrow \frac{14}{6} + \frac{7}{6} \rightarrow \frac{21}{6} \rightarrow 3\frac{3}{6} \rightarrow 3\frac{1}{2}$

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3. 12.5% of £140

12.5% as a fraction is: $\frac{1}{8}$

$\frac{1}{8}$ of £140 divide by 8

$$8 \overline{)140.0} = 17.5$$

= **£17.50** *(Note this is money – so 2 d.p.)*

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4. Score greater than 7 and less than 10

You could draw a table showing all scores that are possible.

A 6 x 6 table as shown.

| sum | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |

Greater than 7 and less than 10
Means a score of **8 or 9**

There are **9** possible scores out of **36**.

So, P(score > 7 and score < 10) = $\frac{9}{36} = \frac{1}{4}$

Alternatively, you could note that scores of 8 and 9 can only be made as follows:

**8:** 6,2 5,3 4,4 3,5 2,6

**9:** 6,3 5,4 4,5 3,6

i.e. 9 possible scores out of 36

So again, probability is: $\frac{9}{36} = \frac{1}{4}$

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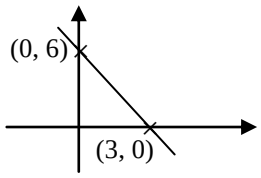
5.

| $x$ | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| $y$ | 6 | 4 | 2 | 0 | –2 |

Using the table we could do a quick sketch.




Gradient = $\frac{rise}{run} = -\frac{6}{3} = -2$

Equation is given by $y = mx + c$

where $m$ is gradient, $c$ is y–intercept

Clearly from the graph, $c = 6$

So equation is: $y = -2x + 6$

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6. $\frac{2}{x} + 1 = 6$

Subtract 1 from each side first $\rightarrow \frac{2}{x} = 5$

Multiply both sides by $x \rightarrow 2 = 5x$

Divide both sides by $5 \rightarrow \frac{2}{5} = x$

So $x = \frac{2}{5}$

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7. Make a cumulative frequency table:

| Speed | frequency | cumulative frequency |
|---|---|---|
| 30 | 1 | 1 |
| 40 | 4 | 5 |
| 50 | 9 | 14 |
| 60 | 14 | 28 |
| 70 | 38 | 66 |
| 80 | 47 | 113 |
| 90 | 51 | 164 |
| 100 | 32 | 196 |
| 110 | 4 | 200 |

Recall, the cumulative frequency column is a running total of the requency

200 items: 100 ↑ 100

Median speed is: 80 kph (nearest 10 kph)

*Look where 100/101st entry is in cum freq. col.*

**CREDIT 2005 – Paper I** *(continued)*

8a) 1st term: $2^2 - 0^2$

2nd term: $3^2 - 1^2$

3rd term: $4^2 - 2^2$

So, 4th term is: $5^2 - 3^2$

8b) Now look for $n^{th}$ term, looking at the pattern

4th term is: $5^2 - 3^2$

4 ; $4+1$ ; $4-1$

So, $n^{th}$ term is: $(n+1)^2 - (n-1)^2$

simplify:

**either** by using difference of 2 squares:

$\rightarrow (n+1+n-1)(n+1-(n-1))$

$\rightarrow (2n)(n+1-n+1) \rightarrow (2n)(2)$

$\rightarrow 4n$

**or** just multiply it all out

$\rightarrow (n+1)^2 - (n-1)^2$

$\rightarrow (n+1)(n+1) - (n-1)(n-1)$

$\rightarrow n^2 + 2n + 1 - (n^2 - 2n + 1)$

$\rightarrow n^2 + 2n + 1 - n^2 + 2n - 1$

$\rightarrow \cancel{n^2} + 2n + \cancel{1} - \cancel{n^2} + 2n - \cancel{1}$

$\rightarrow 4n$

**An alternative simple method:**

Write down the number pattern:

1st term: $2^2 - 0^2 = 4 - 0 = \mathbf{4}$ **1 × 4**

2nd term: $3^2 - 1^2 = 9 - 1 = \mathbf{8}$ **2 × 4**

3rd term: $4^2 - 2^2 = 16 - 4 = \mathbf{12}$ **3 × 4**

4th term: $5^2 - 3^2 = 25 - 9 = \mathbf{16}$ **4 × 4**

Note the terms are going up in 4s.
It is the 4 times table.

$n^{th}$ term: ***n* × 4**

So the nth term will be $4n$

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9.a) This first part is letting you work through the problem with numbers.

£30 petrol into empty tank at 75 pence per litre.

So, amount of petrol in tank =

$30 \div 0.75$ or $30 \div \frac{75}{100}$ (units consistent with £)

$= 30 \times \frac{100}{75} \rightarrow 30 \times \frac{4}{3} \rightarrow$ **40 litres**

Uses 5 litres of petrol per hour
After 3 hours, car has used $3 \times 5 =$ **15 litres**

Petrol remaining: 40 *l* – 15 *l* = **25 litres**.

9b). Now we do the same but with letters.

£20 petrol into empty tank
Cost of petrol *c* pence per litre.

So, amount of petrol in tank =

$20 \div \frac{c}{100}$ or $20 \times \frac{100}{c} = \frac{2000}{c}$ litres

Uses *k* litres of petrol per hour
After t hours, car has used $t \times k = kt$ litres

Petrol *R*, remaining in car:

$\frac{2000}{c}$ litres – $kt$ litres = $\frac{2000}{c} - kt$ litres

So $R = \frac{2000}{c} - kt$

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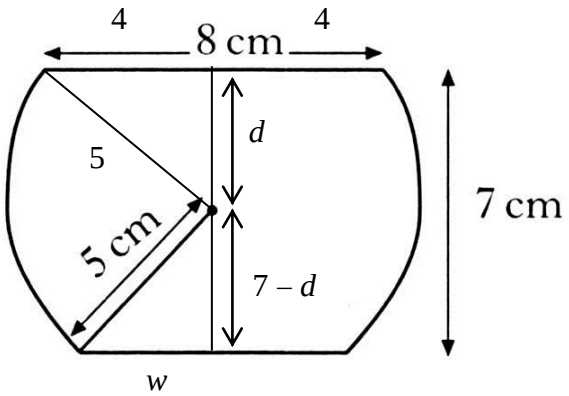
10. Draw a larger diagram and use **Pythagoras**




Mark on: distance from centre to top & bottom.
Draw radius to top. Mark each side of top = 4 cm

In top triangle: $5^2 = 4^2 + d^2$, find $d = 3$

In bottom triangle: $7 - d \rightarrow 4$ (since $d = 3$)

Use Pythagoras again: $5^2 = w^2 + 3^2$ find $w = 4$

So width of base = 2 × 4 = 8cm

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11a). $f(x) = 4\sqrt{x} + \sqrt{2}$

So, $f(72) = 4\sqrt{72} + \sqrt{2}$

Looking for largest squares in the root.

$$f(72) = 4\sqrt{36 \times 2} + \sqrt{2}$$

Use rule of surds $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$

$$f(72) = 4\sqrt{36} \times \sqrt{2} + \sqrt{2}$$

$$f(72) = 4 \times 6 \times \sqrt{2} + \sqrt{2}$$

$$f(72) = 24\sqrt{2} + \sqrt{2}$$

$$f(72) = 25\sqrt{2}$$

11b). Find $t$, if $f(t) = 3\sqrt{2}$

$$f(t) = 4\sqrt{t} + \sqrt{2}$$

But $f(t) = 3\sqrt{2}$

So equating these we have

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

Subtract $\sqrt{2}$ from both sides

$$2\sqrt{2} = 4\sqrt{t}$$

Divide both sides by 2

$$\sqrt{2} = 2\sqrt{t}$$

Square each side – carefully !!!!

$$\sqrt{2} \times \sqrt{2} = 2\sqrt{t} \times 2\sqrt{t}$$

Noting that $\sqrt{t} \times \sqrt{t} = t$

$$2 = 4t$$

Hence $t = \frac{1}{2}$

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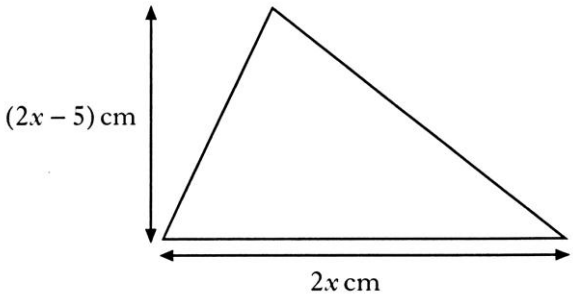
12.




Height of triangle is: $(2x-5)$

Base of triangle is: $2x$

Area of triangle = 7 square centimetres.

Area of triangle = $\frac{1}{2}$ *base* × *height*

Hence:

$$7 = \frac{1}{2} \cdot 2x \cdot (2x-5)$$

Cancelling the half and the 2.

$$7 = \frac{1}{\cancel{2}} \cdot \cancel{2}x \cdot (2x-5) \quad \rightarrow \quad 7 = x(2x-5)$$

Multiplying out right hand side

$$\rightarrow \quad 7 = 2x^2 - 5x$$

Now put everything onto right to make quadratic equation.

$$\rightarrow \quad 0 = 2x^2 - 5x - 7$$

or $$\rightarrow \quad 2x^2 - 5x - 7 = 0$$

Factorise: (*two brackets*)

$$\rightarrow \quad (2x-7)(x+1) = 0$$

So: $2x - 7 = 0$ or: $x + 1 = 0$

$2x = 7$ $x = -1$

$x = \frac{7}{2}$

Cannot be $x = -1$,

since the base would be: –2 cm

So, only solution is: $x$ = 3.5 cm

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*END OF QUESTION PAPER* (*Rev. March 2007)*