

FORM 4 REVISION SHEET 2013

Mental Paper

Number	Question	Working
1	Find the value of x. $2^x = 16$  Answer: _____	
2	Simplify $\frac{2\pi r l + 2\pi r^2}{6\pi}$  Answer: _____	
3	If $\sin x = \frac{12}{13}$ find $\cos x$ .  Answer: _____	
4	Find the equation of a line who passes through the point (0,-1) and has a gradient of 2.  Answer: _____	
5	Write down all prime numbers, which are positive and are also less than 10.  Answer: _____	
6	What is the name of that quadrilateral which has both pairs of opposite sides equal but no right angles?  Answer: _____	

7	<p>Work out:</p> $\frac{50 \times 42 \times 24}{18 \times 35 \times 40}$ <p>Answer: _____</p>	
8	<p>Express 450 as a percentage of 1350.</p> <p>Answer: _____</p>	
9	<p>Three exterior angles of an octagon are <math>(x + 20)^\circ</math> each; another 4 angles are <math>(x - 5)^\circ</math> each; and one angle is <math>x^\circ</math>. Find the size of one of the larger angles.</p> <p>Answer: _____</p>	
10	<p>A packet of 6 bottles of moisturizing liquid costs €15. Find the cost of 2 bottles.</p> <p>Answer: _____</p>	
11	<p>Peter watches his favourite programs on TV every day from 4:15pm to 5:30pm and from 7:15pm to 8:00pm. How many hours of TV does he watch in 5 days?</p> <p>Answer: _____</p>	
12	<p>A mat has an area of <math>0.75\text{m}^2</math>. Find the area occupied by 20 such mats.</p> <p>Answer: _____</p>	
13	<p>Find the value of <math>3x^2 + y</math>, when <math>x = 3</math> and <math>y = -1</math>.</p> <p>Answer: _____</p>	
14	<p>Find the value of <math>\sqrt{150}</math>, to the nearest whole.</p> <p>Answer: _____</p>	

15	Find the value of $y$ for the following simultaneous equations. $3x - 2y = 0$ $2x + y = 7$  Answer: _____	
16	Write the following in standard form 0.0000887.  Answer: _____	
17	Calculate the actual cost of a car, which was sold for €770 at a loss of 30%.  Answer: _____	
18	Given that $3^a = 5$ and $3^b = 8$ , what is the value of $3^{a+b}$ ?  Answer: _____	
19	Calculate the total cost of 32 scarves at €4.50 each and 32 caps at €6.50 each.  Answer: _____	
20	€2700 is divided between Tessa, James and William in the ratio 2:3:4. What is Tessa's share?  Answer: _____	

**Question 1**

The scores on a four sided spinner are 1, 2, 3 or 4. On a second spinner the scores are 5, 6, 7 and 8.

If the two are spun find the probability that:

- a) The sum of two numbers is 9
- b) The product of the two numbers is a prime number
- c) The difference between the two numbers is 2.

**Question 2**

a) Construct a triangle ABC in which  $AB = 12\text{cm}$ ,  $AC = 11\text{cm}$  and  $BC = 8\text{cm}$ .

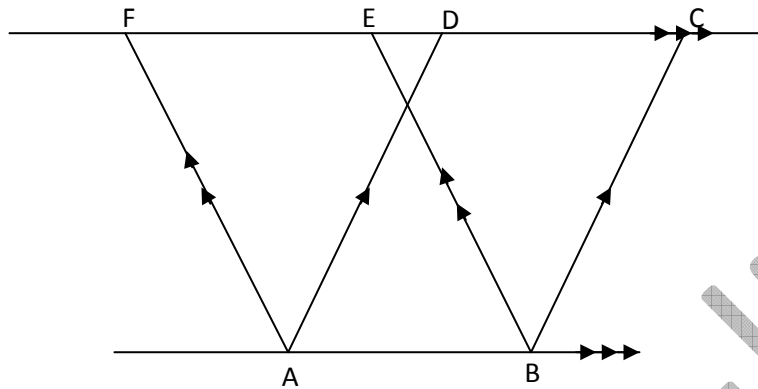
b) Draw the locus of points equidistant from AB and AC.

c) Draw the locus of points equidistant from AC and CB.

d) Mark, with I, the point of intersection of the two loci you have found in (b) and (c). What is special about point I? \_\_\_\_\_

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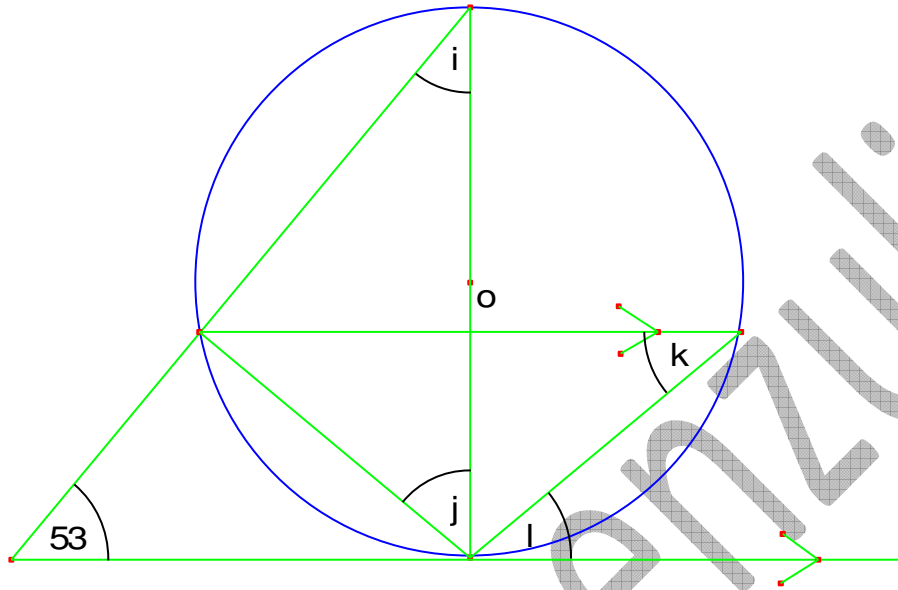
**Question 3**



In the diagram, ABCD and ABEF are parallelograms. Show that  $\Delta$ s ADF and BCE are congruent.

By considering the shape ABCF and then removing each of the triangles AFD and BEC in turn, what can you say areas of the two parallelograms?

Question 4



Find the missing angles.

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**Question 5**

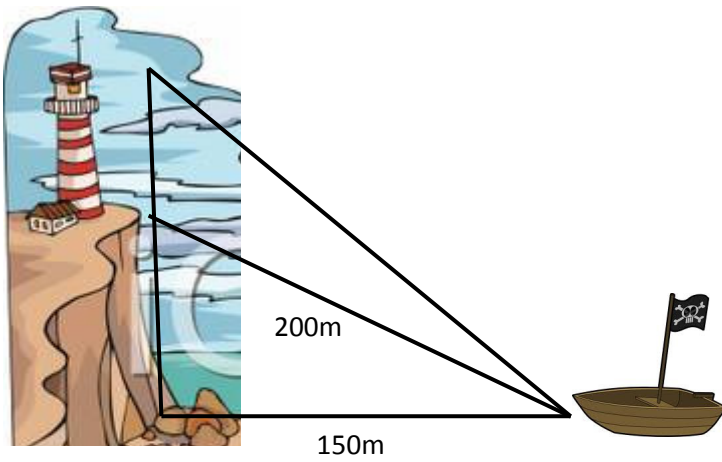
a) In a test, the sum of Harry's marks and Adam's marks is 42. Sam has twice as many marks as Adam, and the sum of Harry's and Sam's marks is 52. What are the marks of each of the three boys?

b) The equation of a straight line is  $y = mx + c$ . When  $x = 1$ ,  $y = 6$  and when  $x = 3$ ,  $y = 10$ . Form two equations for  $m$  and  $c$  and hence find the equation of the line.

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Question 6



a) Work out the height of the cliff.

b) Considering that the angle from the sea to the top of the light house is  $34^\circ$ , what is the angle of depression?

c) Calculate the height of the lighthouse.

**Question 7**

The functions  $f$  and  $g$  are defined by:  $f(x) = \frac{1}{4}x + \frac{1}{2}$  and  $g(x) = 3x^2$ .

a) Find  $f(18)$  and  $g(-3)$

b) Find an expression for  $f^{-1}(x)$ .

c) Hence, solve the equation  $g(x) + 4f^{-1}(x) = 4$ .

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**Question 8**

a) Solve the simultaneous equations:

$$4x - 2y = 7$$

$$12x + 5y = -12$$

b) Express as a single fraction in its simplest form

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

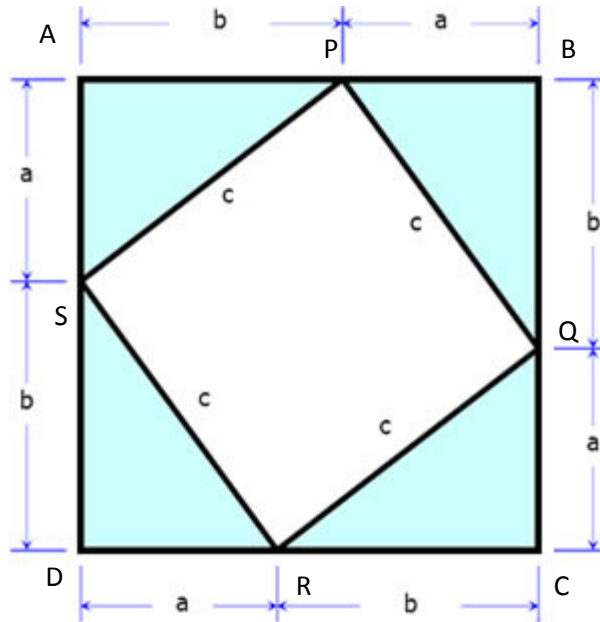
c) Solve the equation

$$\frac{2}{(x+3)} + \frac{5}{(x-3)^2} = \frac{1}{4x}$$

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Question 9



In the diagram, the four grey right-angled triangles are congruent. The square ABCD encloses a smaller square PQRS whose vertices lie on the perimeter of the larger square as shown in the diagram.

- Find the area of the square ABCD by adding the areas of the square PQRS and of the four grey triangles, giving your answers in terms of  $a$ ,  $b$  and  $c$ .
- Using another method, find the area of the square ABCD in terms of  $a$  and  $b$  only.
- Use your results to parts (i) and (ii) above to prove Pythagoras' theorem.

**Question 10**

The following table gives the values of  $y$  satisfying  $y = 4x^3 - 3x$  for different values of  $x$ . Values of  $y$  that are not whole numbers have been rounded to 1 decimal places.

$x$	-1.5	-1.25	-1	-0.75	-0.5	-0.25	0	0.25	0.5	0.75	1	1.25	1.5
$y = 4x^3 - 3x$	<b>A</b>	-4.1	-1	0.6	1	<b>B</b>	0	-0.7	-1	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>

- a) Determine the values of A, B, C, D, E and F in the table above, giving your answers correct to 1 decimal place.
- b) Using a scale of 4cm to represent 1 unit on the x-axis and a scale of 1 cm to represent 1 unit in the y-axis, plot the graph of  $y = 4x^3 - 3x$  for values of  $x$  between -1.5 and 1.5.
- c) Use your graph to estimate the solutions of the equation  $4x^3 - 3x = 0$ .
- d) By drawing a suitable straight line graph using the same axes, determine the solution of the equation  $4x^3 - 5x + 4 = 0$ .

**Question 11**

Three functions  $f$ ,  $g$  and  $h$  are defined as follows:

$$f(x) = x, \quad g(x) = 1 - x \quad \text{and} \quad h(x) = 1 + x$$

a) Express  $\frac{f(x)-1}{g(x)} + \frac{1}{h(x)}$  as a fraction in terms of  $x$  in its simplest form.

b) Solve the equation  $f(x) - 2g(x)h(x) = 1$

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**Question 12**

The table below gives the height of 12 adults correct to the nearest centimeter.

Female	Height	Male	Height
Marica	164	Simon	177
Annabelle	180	Adam	183
Jessica	186	Chris	201
Romina	165	Elton	169
Mariella	196	George	190
Vanessa	189	Edward	196

a) Find the values of A, B and C in the frequency table:

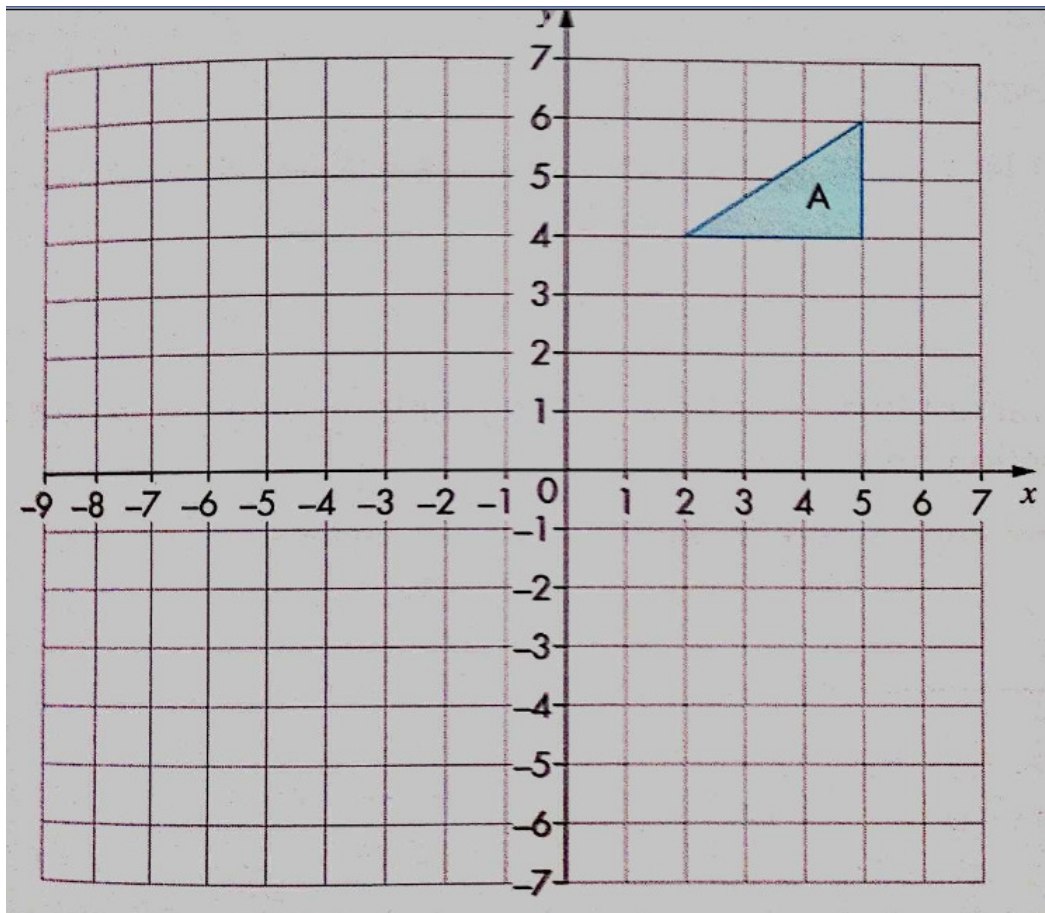
Height , h , in cm	Frequency
$160 < h \leq 170$	3
$170 < h \leq 180$	A
$180 < h \leq 190$	B
$190 < h \leq 200$	C
$200 < h \leq 210$	1
<b>Total</b>	<b>12</b>

b) What is the modal height of the group?

c) Which range contains the median height?

d) Estimate the mean height of the group.

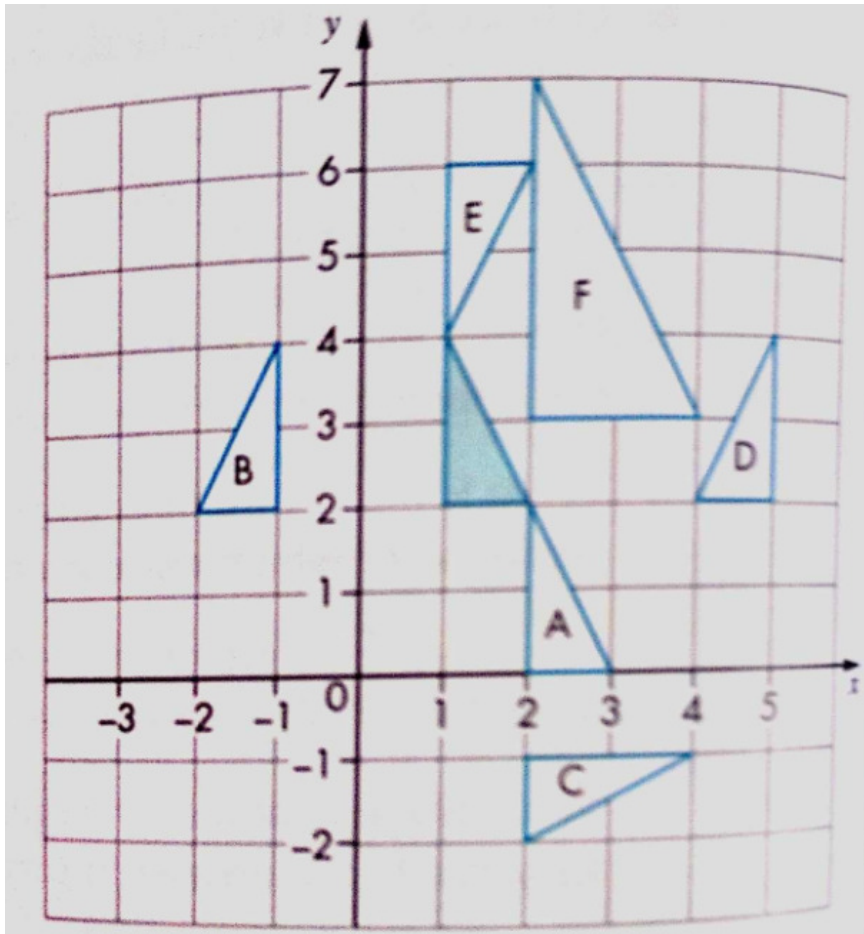
Question 13



- a) Triangle A is translated by vector  $\begin{pmatrix} -2 \\ -3 \end{pmatrix}$  to give triangle B
- b) Triangle B is then enlarged by a scale factor 2 about the origin to give triangle C.
- c) Describe fully the single transformation that maps triangle C onto triangle A.



Question 14



Describe fully the transformations that will map the shaded triangle onto each of triangles A – F.

**Question 15**

Solve the following equations. When not a whole number, round your answers correct to 1 decimal place.

a)  $x^2 + 3(2x + 1) = 6x + 5$

b)  $x(3x - 5)(x + 4)(x - 7) = 0$

c)  $3x^2 = 5x + 4$

d)  $\frac{4x^3}{3} = \frac{x^3}{2} + \frac{160}{3}$

e)  $3^x = \frac{1}{27}$