



Year 9 Academic Scholarship

Sample Paper

Maths

Time allowed: 60 minutes

#### INSTRUCTIONS TO CANDIDATES

Attempt as many questions as you can, you may not have time to do all of them

Calculators are permitted

Always make your method clear and show your working

NAME:

SCORE:

1. Without the use of a calculator work out  $2 \cdot 31 \times 0 \cdot 34$

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[3]

2. What is the remainder when 477 is divided by 15?

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[2]

3. Show that

(a)  $1\frac{2}{3} - 1\frac{1}{2} = \frac{1}{6}$

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[2]

(b)  $3\frac{1}{2} \div 2\frac{4}{5} = \frac{5}{4}$

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[2]

4. Use methods for adding and subtracting fractions to write the following as a single fraction

(a)  $\frac{3x}{4} + \frac{2x}{5}$

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[3]

b)  $\frac{3}{x-2} - \frac{4}{x+1}$

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[4]

5. Simplify

(a)  $3k^2 \times 2k^5$

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[2]

(b)  $(y^2)^5$

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[1]

6. Given

$4^a \times 4^a = 4$  find  $a$

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[1]

7. Remove the brackets and simplify:

(a)  $4(x + 3) - 3(x + 2)$

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[3]

(b)  $(3x + 4)(x - 2)$

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[3]

(c)  $(2x + 1)^2$

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[2]

(d)  $(x + y)(x - y)$

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[2]

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

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[3]

8. Solve

(a)  $3(x+1) - 2 = 16$

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[3]

(b)  $\frac{6x-2}{5} - \frac{5x-3}{7} = 1$

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[3]

9. Solve the inequalities

(a)  $3(x-1) < 2(1-x)$

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[2]

(b)  $7 < 15 - x$

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[2]

(c)  $7 - 3x < 0$

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[1]

(d) State the smallest possible integer value of  $x$  given  $7 - 3x < 0$

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[1]

10. The perimeter of the rectangular picture is 36 cm.

The sides of the rectangle are  $2x - 5$  and  $x + 2$ .

a) Find the value of  $x$

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*The picture is not to scale*

$x + 2$

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[3]

b) Comment on the rectangle.

[1]

11. Rewrite the following Add brackets to the following calculations to make them correct:

a)  $3 + 2 \times 4 + 2 \times 3 = 90$

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[2]

(b)  $5 \times 2 + 7 + 1 = 2 + 3 \times 8 + 6$

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[2]

(c)  $5 + 3^2 - 6 \times 7 = 406$

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[2]



14. A 17-Wedge is shown below

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30
31	32	33	34	35
36	37	38	39	40
41	42	43	44	45
46	47	48	49	50

a)  $W(17)$  is the sum of the numbers in a 17-Wedge. Calculate  $W(17)$

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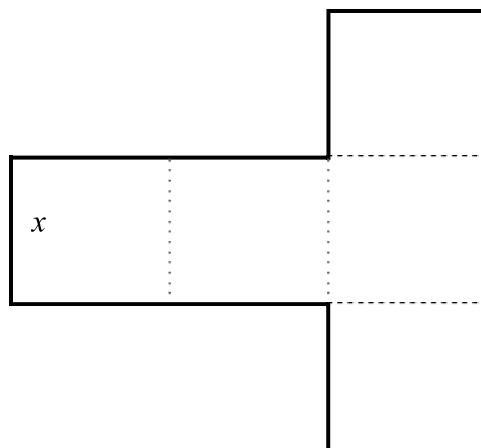
[1]

b) Draw in the 43-Wedge on the grid above. Calculate  $W(43)$

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[1]

c) Complete the  $x$ -Wedge.



a. Work out  $W(x)$  simplifying your answer as much as possible.

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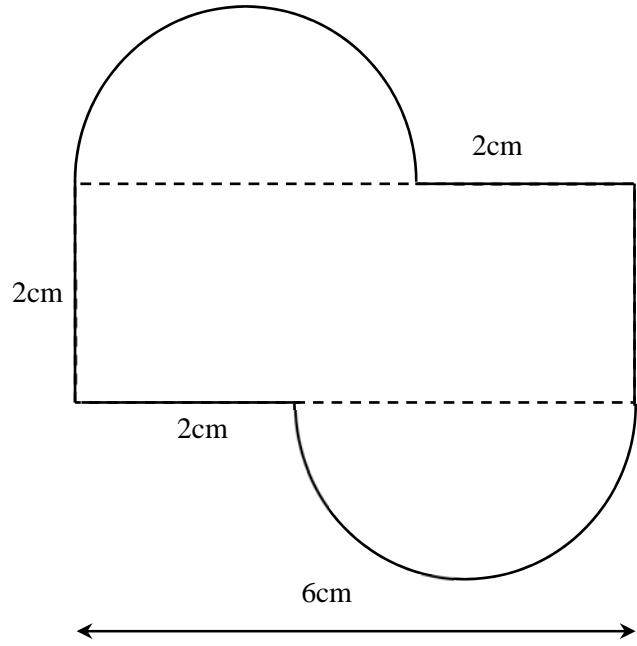
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e) Find the perimeter and the area of the shape below. The arcs are semicircles.




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a. The probability that Mr Hipperson, an amateur clay pigeon shooter, actually hits a clay is (regrettably for all concerned) only  $\frac{1}{10}$ .

If four separate attempts are made, find the probability that Mr Hipperson will hit:  
four clays

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[2]

b. at least one clay

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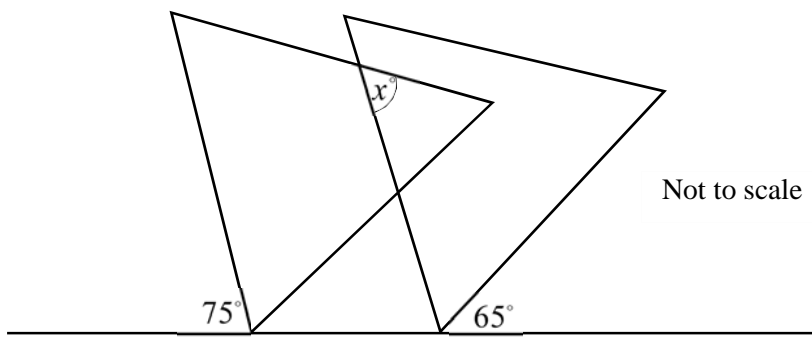
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[4]

f) The diagram shows two equilateral triangles. What is the value of  $x$ ?



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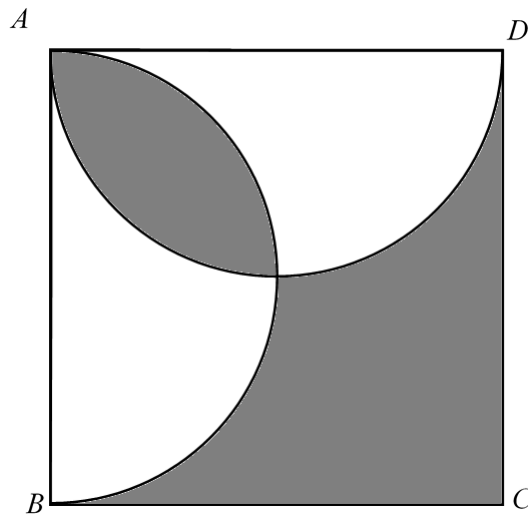
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[3]



- i) The diagram shows a square  $ABCD$  and two semicircles with diameters  $AB$  and  $AD$ . If  $AB = 2$ , without using a calculator find the area of the shaded region?



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[2]

- j) Surgeons can operate to cure Pythagoratositis but the success rate at the first attempt is only 65%. If the first operation fails, the operation can be repeated but this time the success rate is only 20%. After a second failure there is so little chance of success that the surgeons will not operate again.

There is an outbreak of the disease in Tallis and 38 pupils contract the disease. How many of the students can we expect to be saved after both operations?

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[3]