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 $2 \cdot 31 \times 0 \cdot 34$

[3]

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

[2]

3. Show that

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

[2]

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

[2]

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

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

[3]

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

[4]

5. Simplify

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

[2]

(b) $\left(y^2\right)^5$

[1]

6. Given

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

[1]

7. Remove the brackets and simplify:

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

[3]

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

[3]

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

[2]

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

[2]

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

[3]

8. Solve

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

[3]

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

[3]

9. Solve the inequalities

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

[2]

(b) $7 < 15 - x$

[2]

(c) $7 - 3x < 0$

[1]

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

[1]

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

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

The picture is not to scale

a) Find the value of x

[3]

b) Comment on the rectangle. [1]

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

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

[2]

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

[2]

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

[2]

12. Find the Highest Common Factor and Lowest Common Multiple of 3780 and 3240.

[5]

13. Solve the simultaneous equations

$3x + 2y = 11$

$2x - y = -3$

[4]

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

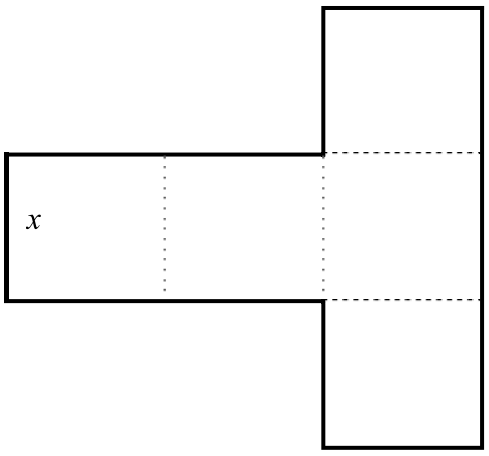
a) $W(17)$ is the sum of the numbers in a 17-Wedge. Calculate $W(17)$

[1]

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

[1]

c) Complete the x -Wedge.



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

[3]

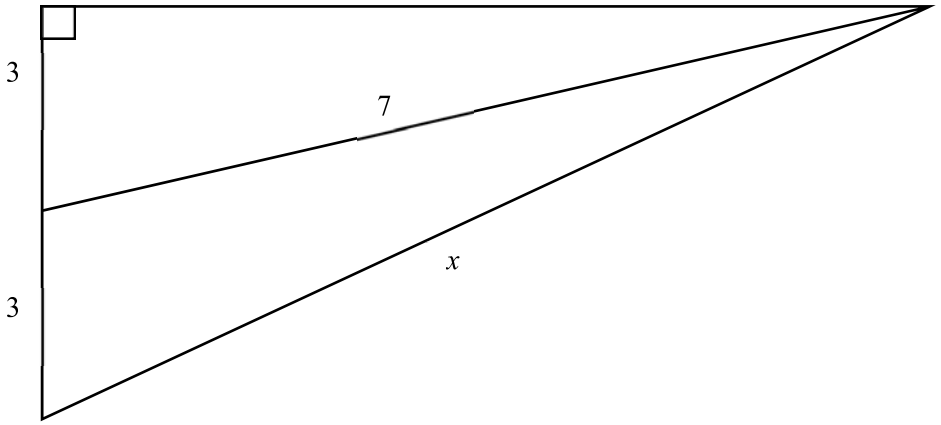
b. Hence, find which Wedge adds to 97

[3]

c. Can a Wedge add to 200? Explain your answer.

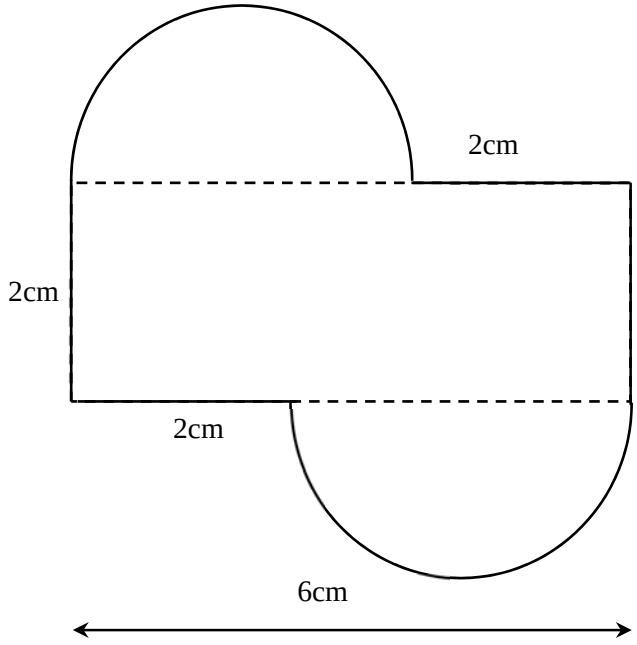
[2]

d) Find x



[3]

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



[3]

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

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

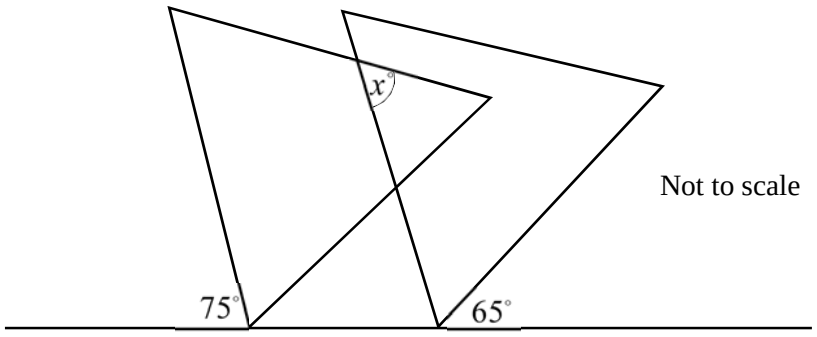
four clays

[2]

b. at least one clay

[4]

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



Not to scale

[3]

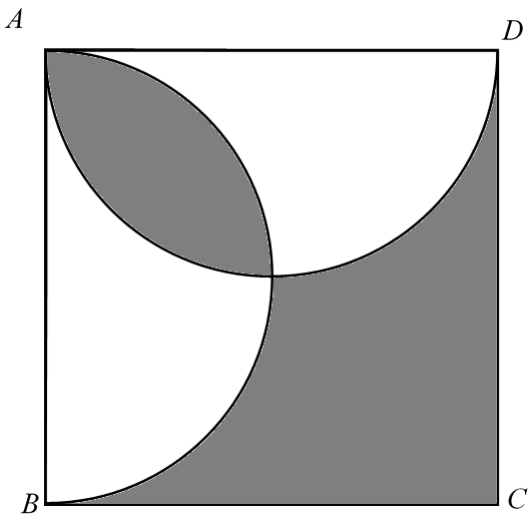
g) The Headmaster, Mr Robb, had a busy year in 2017, dealing with emails. An increase in the number of emails meant that he had 20% more to deal with than in 2016, but his reply rate decreased. In 2016, he replied to 80% of his emails, but in 2017 he replied to only 60% of them. What was the percentage change in the number of emails he replied to in 2017 compared with 2016.

[3]

h) The Prime Warden of the Worshipful Company of Fishmongers caught a fish so big that she had to cut it into three pieces (head, body and tail) in order to weigh it. The tail weighed 9kg and the head weighed the same as the tail plus one third of the body. The body weighed as much as the head and tail together. How much did the whole fish weigh?

[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?



[2]

j) Surgeons can operate to cure Pythagoratosis 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?

[3]