Your Name:

Candidate Number:

		.	2			

City of London School

Specimen Entrance Examination
to join First Form

MATHEMATICS

1 hour

Do not open this booklet until you are told to do so.

INSTRUCTIONS

- Answer as many questions as you can in the spaces provided.
- Show all your working clearly.
- Be careful not to spend too long on any one question.
- Calculators are not allowed.

Leave blank

		%
Score		
Total	60	
Marker		

1. For this question you can do rough working on the left hand side of the page if required.
Put answers only in the spaces on the right.

$2.74 \times 10{,}000 =$ .....

$13^2 =$ .....

The square root of 49 is .....

The cube root of 125 is .....

$4^3 =$ .....

$\frac{240}{300}$ in its simplest form is .....

25% of 68 = ...

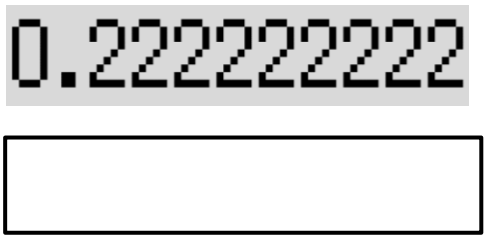
$43 \times 38 =$ .....

(8)

2. The calculator display below shows $\frac{2}{9}$ as a decimal.

Complete the empty box to show how the calculator would display the answer to $\frac{2}{900}$.

<u>You do not need to write your digits in the same style</u>, but you should use 10 digits.



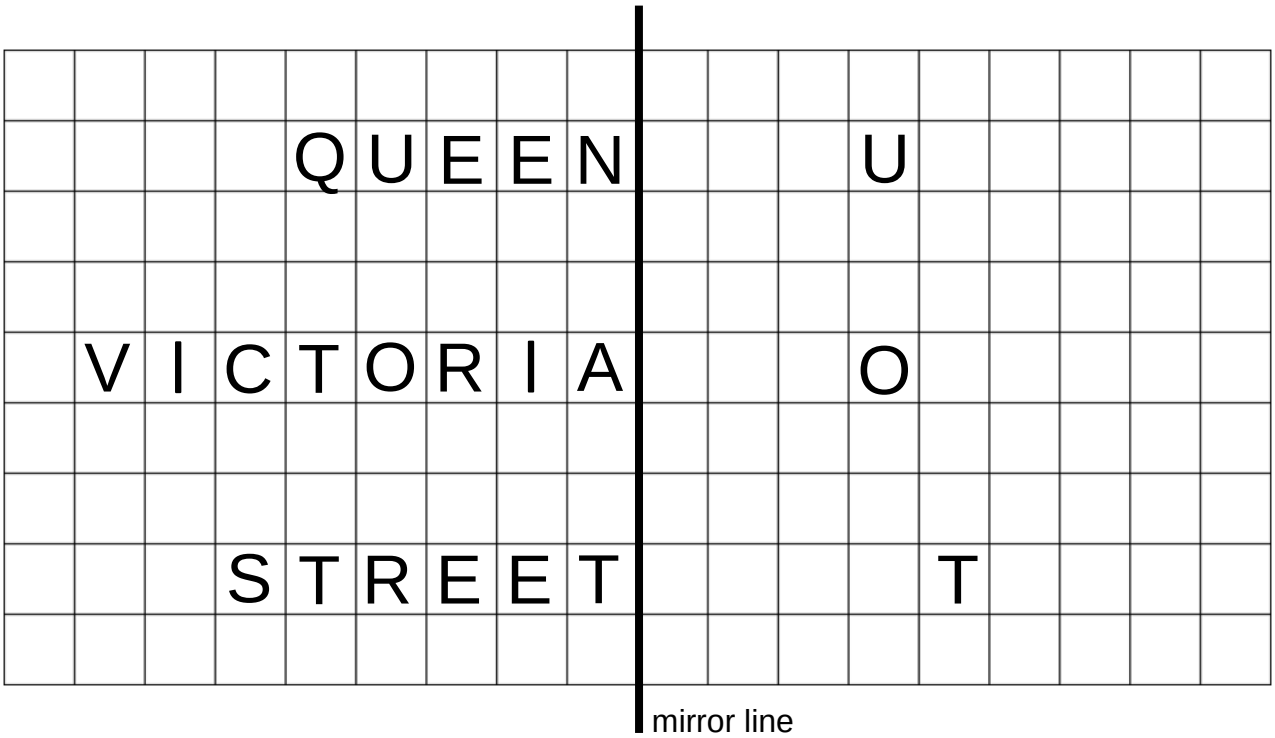
(1)

3. I buy 7 drinks at 72p each, and 9 sandwiches at £1.21 each.
How much **<u>change</u>** do I get from a £20 note?

£.....

(2)

4. Reflect the letters in the mirror line below. Three letters have been done for you.



(2)

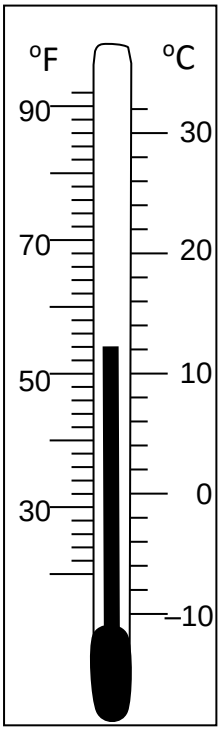
5. Martin is given £240. He gives $\frac{1}{8}$ to his sister and $\frac{1}{5}$ of what remains to his little brother. How much does he keep himself?

£.....

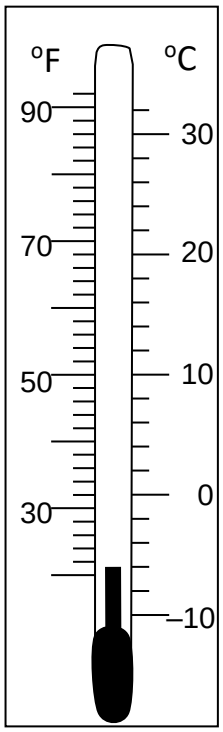
(2)

6. The thermometers below show the temperature recorded at midday yesterday and midnight last night.

Midday



Midnight



(i) What was the temperature midday yesterday in °F?

……°F

(ii) What was the temperature midnight last night in °C?

……°C

(iii) What was the difference in temperature between midday yesterday and midnight last night in °C?

……°C

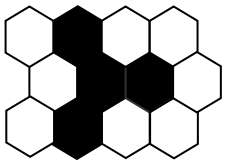
(3)

7. How many minutes are there between 9.23 am and 1.06 pm?

……minutes

(2)

8.



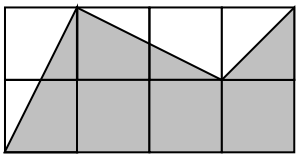
(i) What fraction of the above design is shaded? Give your fraction in its simplest form.

.....

(ii) How many more of the hexagons need to be shaded so that $\frac{3}{4}$ of the design is shaded?

.....

(iii) What fraction of the large rectangle below is shaded?



.....

(3)

9. (i) Write 15% as a fraction in its simplest form.

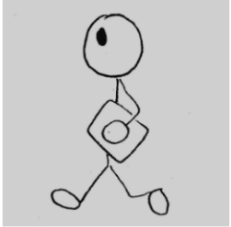
.....

(ii) Rowan sends 7 text messages each day.
A £5 credit buys him 140 text messages.
Today he received an extra 15% free text messages when he bought his £5 credit.
How many days should the credit last? Show your working.

.....days

(3)

10. In a sponsored walk: Adam took 4 hours, 39 minutes;
Billy took 274 minutes and Charlie took $4\frac{3}{5}$ hours.
Who was quickest and who was the slowest?



Quickest ..... Slowest.....

(1)

11. The diagram below shows two overlapping rectangles.

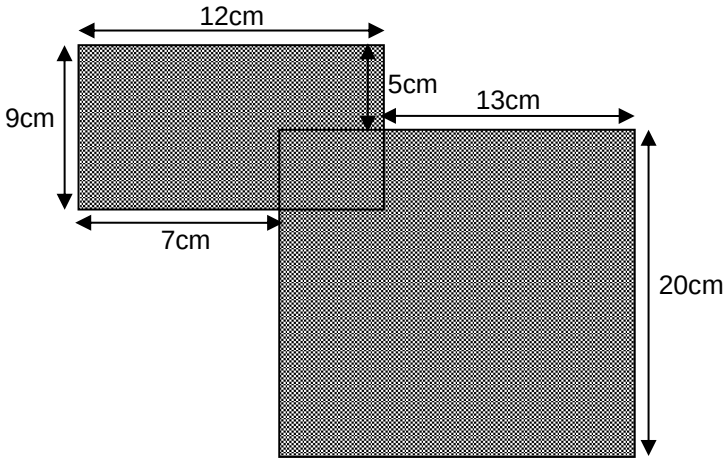


Diagram **not** drawn to scale

i) Calculate the area of the **larger rectangle** only.

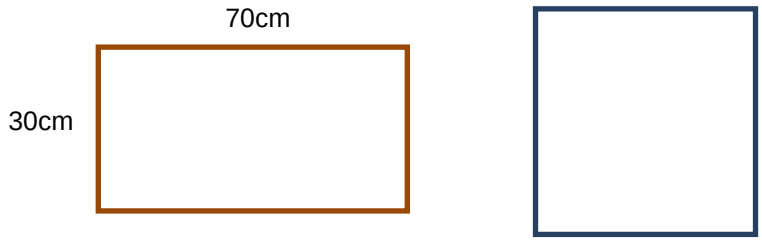
……cm^2

ii) Calculate the **total** shaded area that the rectangles cover.

……cm^2

(4)

12. The diagram below shows a rectangle and a square. The diagrams are **not** drawn to scale.

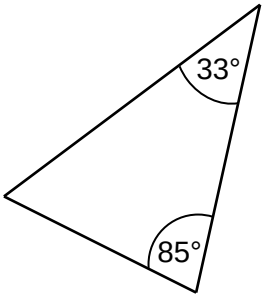


If they have equal perimeters, what is the difference in their area?

……cm^2

(2)

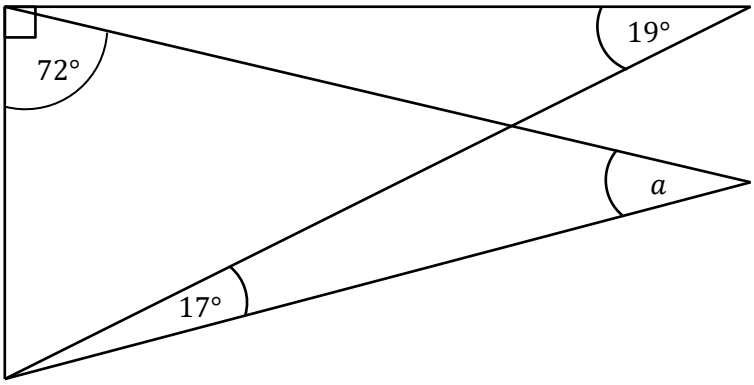
13. Calculate the size of the missing angle in this triangle. The diagram is **not** drawn to scale.



.....°

(1)

14. (*a*) Find the size of angle 'a' in the diagram below.



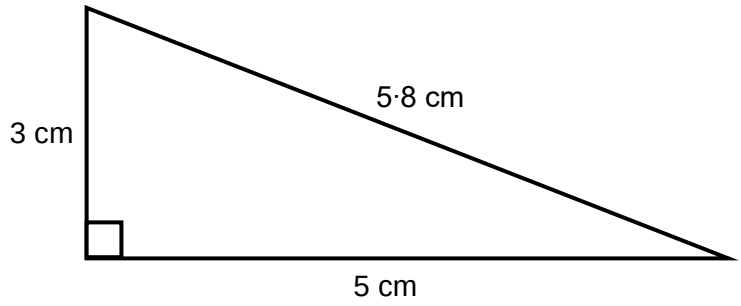
a = ...°

(*b*) Would you describe 100°? Acute, obtuse or reflex?

.....

(3)

15. A right angled triangle is shown below. It is not drawn to scale.



(i) Calculate the perimeter of the triangle.

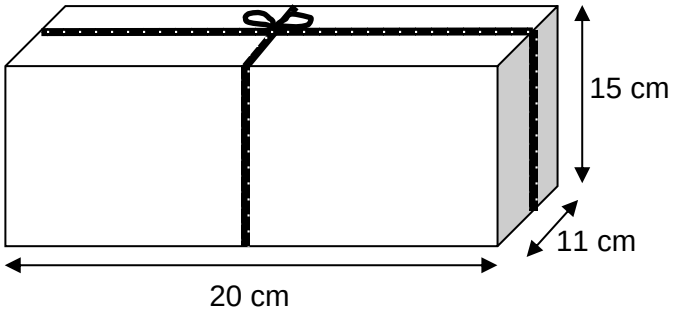
……cm

(ii) Calculate the area of the triangle.

……cm^2

(2)

16.



The diagram above is not drawn to scale.

(i) A box measures 20cm by 11cm by 15cm. Calculate the volume of the box.

……cm^3

(ii) A string is tied around the box with a bow at the top as shown in the diagram.
If the length of the bow is 8 cm, calculate the <u>total</u> length of string used.

……cm

(4)

17. 20, 21, 22, 23, 24, 25, 26, 27, 28,

Write one number from 20 to 30 that satisfies the descriptions below.
Some numbers are used more than once.

(i) Prime?

……

(ii) Cube numbers?

……

(iii) Square numbers?

……

(iv) Fibonacci numbers?
The Fibonacci numbers follow the sequence 1, 1, 2, 3, 5, 8, 13…

……

(v) Triangular numbers?
The triangular numbers follow the sequence 1, 3, 6, 10, 15, …

……

(vi) Perfect numbers?
A perfect number is a number whose factors (not including itself) add up to itself.
e.g. 6 is a perfect number because 1 + 2 + 3 = 6.

……

(vii) Powerful numbers?
*A powerful number has the property that for **every** prime number which divides into it, that **prime** number squared also divides into it.*
e.g. 16 is a powerful number because both 2 and 2^2 are factors.

……

(7)

18. What is $4 - ((4 + 4) \div 4)$?

.....

(1)

19. $1001 = a \times b \times c$, where *a*, *b* and *c* are prime numbers, with *c* is bigger than *b*, and *b* bigger than *a*.

Find *a*, *b* and *c*

a = ..., *b* = ..., *c* = ...

(2)

20. Given that 2357 × 99 = 233 343, find:

(i) 233 343 ÷ 99

.....

(ii) 235·7 × 99

.....

(2)

21. The symbol $\oplus\!\!\!\rightarrow$ has a special meaning in arithmetic.

$a \oplus\!\!\!\rightarrow b$ means add a and b and then multiply by a.

For example:

$$4 \oplus\!\!\!\rightarrow 2 = 4 \times (4 + 2)$$
$$= 4 \times 6$$
$$= 24$$

(*a*) Work out $4 \oplus\!\!\!\rightarrow 5$

.....

(*b*) Work out $4 \oplus\!\!\!\rightarrow (3 \oplus\!\!\!\rightarrow 2)$

.....

(*c*) Work out the value of p such that $6 \oplus\!\!\!\rightarrow p = 78$

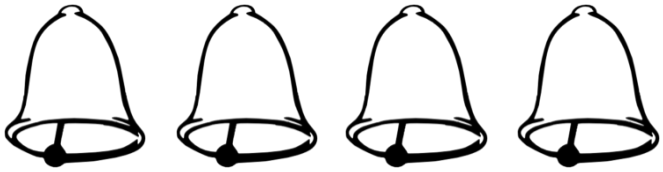
$p =$ .....

(3)

22. Four bells ring at intervals of 2, 8, 7 and 11 seconds.

If they are all rung at the same time, how many seconds will pass before they all ring at the same time again?

You should show some justification for your answer.



…… seconds

(2)

END OF EXAM

Now go back and check your work!

Mark	%
1	2%
2	3%
3	5%
4	7%
5	8%
6	10%
7	12%
8	13%
9	15%
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Mark	%
31	52%
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43	72%
44	73%
45	75%
46	77%
47	78%
48	80%
49	82%
50	83%
51	85%
52	87%
53	88%
54	90%
55	92%
56	93%
57	95%
58	97%
59	98%
60	100%