

# SEVENOAKS SCHOOL



## YEAR 9 (13+) ENTRANCE EXAMINATION

April 2021 for entry in September 2022

# MATHEMATICS

Your Name: \_\_\_\_\_

Your School: \_\_\_\_\_

**Time allowed:** 1 hour

**Equipment needed:** Pen, pencil, eraser.

### Information for candidates:

1. Calculators, dictionaries, rulers and protractors are NOT allowed.
2. Write your name and school on this page.
3. Write your answers on the question paper in the space provided.
4. There are 20 questions in this paper. Try to answer all of them, but don't worry if you don't complete the paper. If you get stuck, just go on to the next question and if you have time at the end come back to the one(s) you left.
5. There are 60 marks in total available for this paper. Marks for each question are shown in square brackets [ ] after the question.
6. Show all your working. You may be awarded marks for correct working even if your final answer is incorrect, and a correct answer unsupported by correct working may not receive full marks.

### Glossary for candidates with English as an additional language

**Protractor** – an instrument for measuring angles, typically semi-circular

**Justify** – give a reason for

**Runner-up** – person coming second

**Perimeter** – distance around the outside of a shape

**Measuring cylinder** – a jug or container with a scale

**Ascending** – increasing in size

1. Work out the value of  $\frac{3}{8}$  of 24

\_\_\_\_\_ [1 mark]

2. Simplify  $8x - 4x^2 - 5x - 4x^2$

\_\_\_\_\_ [2 marks]

3. Simplify:

a.  $a^6 \div a^3$

\_\_\_\_\_ [1 mark]

b.  $2x^4y^2 \times 5y^3$

\_\_\_\_\_ [2 marks]

4. Expand and simplify:

a.  $9mn - n(3 - 7m)$

\_\_\_\_\_ [3 marks]

5. a. By rounding each number to **2** significant figures, estimate the answer to  $\frac{200}{16.3 \times 25.2}$ .

\_\_\_\_\_ [2 marks]

- b. Is your answer in part (a) larger or smaller than the actual answer, you must justify your decision.

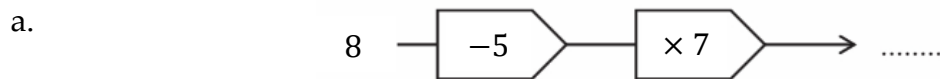
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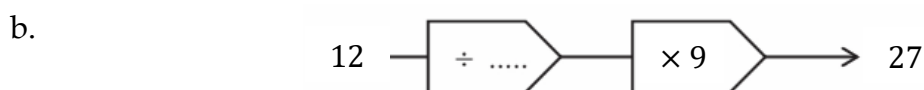
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[1 mark]

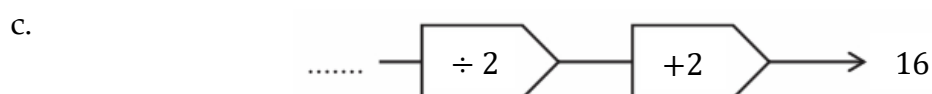
6. Complete the **missing numbers** in each of the function diagrams below.



[1 mark]



[1 mark]



[1 mark]

7. Given that  $p = -2$  and  $q = 25$ . Find the value of  
 $p^2q - (5p)^2$

\_\_\_\_\_ [2 marks]

8. The cost of petrol is £1.20 per litre. Alice buys £48 worth of petrol.

a. How many litres of petrol does she buy?

\_\_\_\_\_ [2 marks]

b. Alice can drive 8.5km for every litre of petrol. How many km can she drive using the petrol she bought?

\_\_\_\_\_ [1 mark]

9. A jar contains 60 jelly beans. If 35% of the jelly beans are removed, how many remain in the jar?

\_\_\_\_\_ [2 marks]

10. In a mathematics competition, the winner won £100 more than twice the amount won by the runner-up. The total winnings were £2350. Let the amount won by the runner-up be  $r$ .

Form an equation in  $r$  for this information and solve it to find out how much the winner received.

\_\_\_\_\_ [5 marks]

11. The grid below contains numbers where all rows, columns and diagonals have the same product.

Complete the grid.

8		$\frac{2}{5}$
	2	
	$\frac{8}{5}$	$\frac{1}{2}$

[3 marks]

12. A sports club has 65 men and 35 women as members. A new activity has just begun and 50 new members have joined. Given that the number of men is now 60% of the total members, how many of the 50 new members were women?

\_\_\_\_\_ [3 marks]

13. A rectangle is 50cm long and 40cm wide. Its length is extended by 12% and its width is reduced by 15%.

a. Does the perimeter of the rectangle change? Justify your answer.

\_\_\_\_\_ [3 marks]

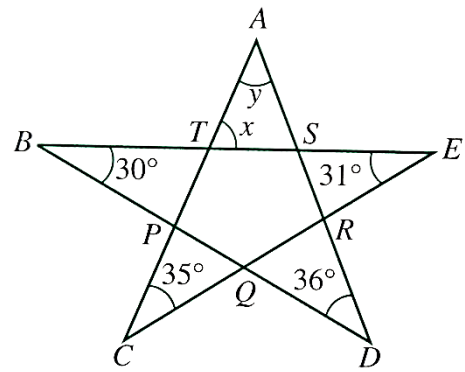
b. Does the area of the rectangle change? Justify your answer.

\_\_\_\_\_ [2 marks]

14. Tasha scored an average of 78% across three of her five exams this year. She wants to score 85% minimum this year. What is the lowest score she can gain in her fourth exam to achieve her desired goal?

\_\_\_\_\_ [3 marks]

15. Find the angles  $x$  and  $y$  in this diagram.



\_\_\_\_\_ [4 marks]

16. Nadia visits a restaurant every five days. She visited the restaurant on Sunday 1 January 2017.

What is the date of her next Sunday visit?

\_\_\_\_\_ [3 marks]

17. A sequence is formed by

$$1 \times 2^2, 2 \times 3^2, 3 \times 4^2, \dots$$

a. Find the next two terms of the sequence

\_\_\_\_\_ [2 marks]

b. Work out the 10<sup>th</sup> term of the sequence

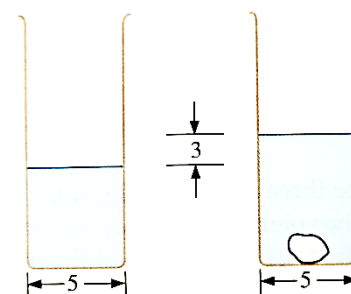
\_\_\_\_\_ [1 mark]

18. The prices of two items  $P$  and  $Q$  in a shop are in the ratio of 4: 5. When the price of  $P$  is increased by £12 and the price of  $Q$  is reduced by £6, then the items have the same price. Find the original price of  $P$ .

\_\_\_\_\_ [3 marks]

19. A measuring cylinder with diameter 5cm is partially filled with water. When a stone is placed in the cylinder, as shown, the water level rises by 3cm.

Find the volume of the stone in terms of  $\pi$



\_\_\_\_\_ [3 marks]

20. Given the values,

$$w = 2^{129} \times 3^{81} \times 5^{128}$$

$$x = 2^{127} \times 3^{81} \times 5^{128}$$

$$y = 2^{126} \times 3^{82} \times 5^{128}$$

$$z = 2^{125} \times 3^{82} \times 5^{129}$$

Then write these numbers in ascending order.

\_\_\_\_\_ [3 marks]