

ST PAUL'S SCHOOL
Est. 1509

JUNIOR SCHOLARSHIP EXAMINATION

MAY 2019

MATHEMATICS

2 hours

Answer as many questions as you can in any order you wish. If you cannot do a question, move on to the next one and come back later.

Credit will be given for reasoning and working where appropriate.

When the answer is a fraction it should be given in mixed form, e.g. $3\frac{4}{5}$

The total number of marks for this paper is 100.

The mark allocation is shown in brackets at the end of each part of each question.

CALCULATORS MAY NOT BE USED.

Name:.....

- 1 (i) Factorise fully $15y - 3xy$

Answer [1]

- (ii) Express $\frac{2}{p} - \frac{3p}{4}$ as a single fraction.

Answer [2]

- (iii) Multiply $2a + 3c$ by $2(3a - 2c)$. Expand and simplify your answer.

Answer [3]

- 2 Eight boys whose mean age is 12 years and 5 months join a class of 16 boys whose mean age is 12 years and 8 months. Find the new mean age of the whole class.

Answer [4]

3 Work out:

(i) $0.012 \div 0.2 \times 0.21$

[3]

Answer

(ii) $\left(\frac{3}{2}\right)^2 - 1\frac{4}{5} \div 2\frac{4}{7}$

[4]

Answer

4 An item's value increases by 30%. This new value then decreases by 25%.

(i) Is the item now worth more or less than it was originally?

[1]

Answer

(ii) What is the final increase or decrease as a fraction of the original value?

[3]

Answer

5 Solve the equations:

(i) $3 = \frac{5x}{x-2}$

Answer [3]

(ii) $\frac{2y}{5} - \frac{y-5}{20} = 14$

Answer [4]

- 6 (i) Write 90 and 168 separately as products of their prime factors.

Answers [3]

- (ii) Find the lowest common multiple of 90 and 168

Answer [3]

- (iii) What is the smallest whole number that when squared is a common multiple of 90 and 168?

Answer [3]

- 7 Four interior angles of a pentagon are equal. Their sum is nine times the fifth interior angle. Find the fifth interior angle.

Answer [4]

- 8 Solve the simultaneous equations:

$$3x + 8y = -2$$

$$\frac{x}{3} - 2y = 7$$

Answer [5]

- 9** Find the values of each of the following when $p = 2, q = -1, r = -3$:

(i) $\frac{3(p-r)^2}{q}$

[3]

Answer

(ii) $-r^2(p+q+r)^3$

Answer [3]

- 10** A prize of £148 is shared between three children in the ratio of their ages (in complete years), and each child receives a whole number of pounds. The eldest child is twice the age of the youngest and the middle child receives £52.

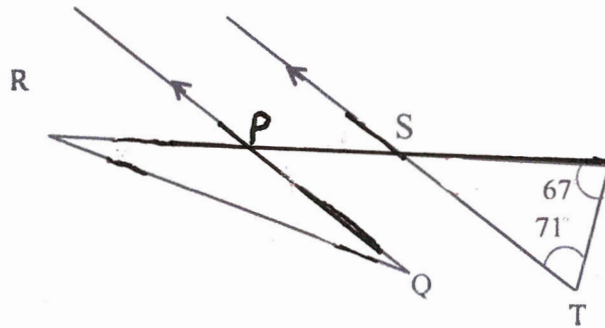
- (i) How much does the eldest child receive?

Answer [3]

- (ii) How old is the youngest child?

Answer [2]

- 11 Given that the lines PQ and ST are parallel and the lengths PQ and PR are equal, find the size of angle PQR . Justify your steps.



Answer [4]

- 12** (i) The first four terms of a sequence are 13.5, 10, 6.5, 3

(a) Write down, giving a reason, the next term.

Answer [1]

(b) What is the 100th term?

Answer [2]

- (ii) The first four terms of another sequence are $\frac{3}{5}$, $\frac{4}{3}$, 5, -6

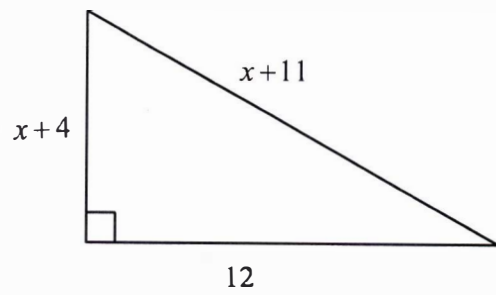
(a) Write down, giving a reason, the next term.

Answer..... [2]

(b) What is the 100th term?

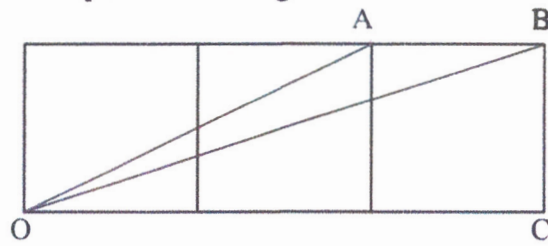
Answer..... [2]

- 13 Find the value of x .



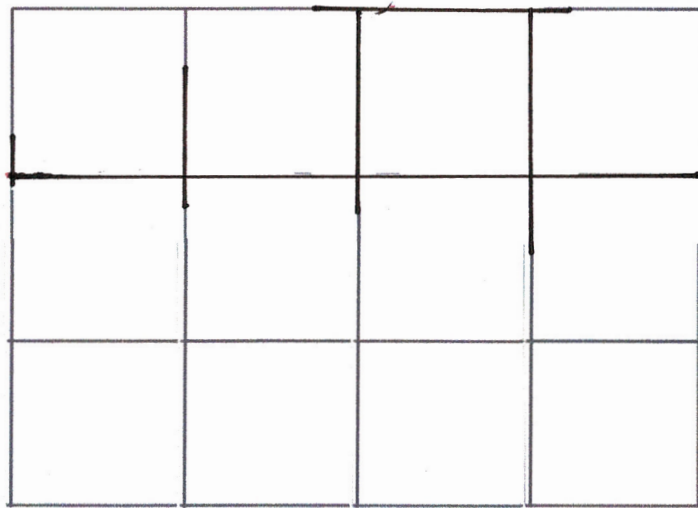
Answer [5]

- 14 There are three squares in the diagram.



Find $\angle AOC + \angle BOC$.

Use the grid of squares below to work out your answer. No marks will be given for measuring.



Answer [4]

- 15 How many three digit numbers that are multiples of 6 consist of three different even digits?

Answer [5]

- 16** (i) Arjun travels for 4 hours at 55 miles per hour and for 420 miles at 70 miles per hour. Find his average speed for the entire journey.

Answer [3]

- (ii) Kathy's average speed is 60 miles per hour for her whole journey. There are two parts to her journey. In the first part, she travels for 105 miles at 70 miles per hour. If her speed is 48 miles per hour for the second part, how long did the whole journey take?

Answer [5]

- 17 A rectangular shed of length 5m and width 3m sits in a large grass field. A goat is tied up to a corner of the shed by a 6m lead. The goat can walk around the shed but cannot go inside or through it. Find the total area of grass that the goat can eat. Give your answer as a multiple of π .

Answer [5]

- 18** A group of five people each bring along their favourite book. The five books are all different. Each person gives their book to someone else in the group and receives one book from someone else in the group. In how many ways is this possible?

Answer..... **[5]**

END OF PAPER

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