OUNDLE
School

EXAMINATION PAPER
13+ Academic Scholarship 2024

Mathematics (Paper 1)

Time allowed: 1 hour

Name: _____

Instructions

- Calculators are **NOT** allowed.
- Write ALL your working and answers on this paper. Show enough working on each question to make it clear how you reached your answer.
- Do not spend too long working on any one question. Do not worry if you do not manage to complete every question.
- You may work in pen or pencil.

Question 1
An Olympic dive is scored as follows:

Seven judges give a score out of 10; the two top and two bottom scores are ignored and the sum of the three remaining scores is calculated. This sum is then multiplied by the difficulty rating of the dive.

(a) Tom performs a dive with a difficulty rating of 3.2 and receives the following scores from the judges:

7.5, 8.5, 7.0, 7.5, 8.5, 7.0, 9.0

Calculate Tom's total score for the dive.

Answer …….

(b) Greg achieves a score of 68.55 on his dive. How many more points did Tom score?

Answer …….

(c) Lauren achieved a final score of 58.8 for a dive with a difficulty rating of 2.4. What was the sum of the three judge's scores used?

Answer …….

Question 2 Work out the following, obeying the correct order of operations.

(a) $14 + 8 - 7 + 5$

Answer .....

(b) $19 - 20 \div (6 - 4 \times 2)$

Answer .....

(c) $5 \times 4^2 - (1 - 3)$

Answer .....

(d) $((3 + 2 \times 4)^2 - 7) \div 2$

Answer .....

Question 3

(a) Write 84 as a product of its prime factors

Answer .....

(b) List all the factors of 84, in ascending order

Answer .....

Question 4 Calculate the following. Your answers should be fully simplified and written as a mixed number where appropriate.

(a) $\frac{2}{3}+\frac{3}{7}$

Answer .....

(b) $\frac{3}{14}-\frac{1}{6}$

Answer .....

(c) $\frac{7}{24}\times\frac{16}{21}$

Answer .....

(d) $\frac{7}{8}\div\frac{17}{24}$

Answer .....

Question 5

(a) Two security guards continuously patrol a museum, each with a different patrol route starting and ending at the same place. The first guard takes 24 minutes to patrol her route and the second guard takes 30 minutes to patrol his. If they both start patrolling at 9pm, what time will it be when the two guards meet at the start point again?

Answer …….

(b) 20 chemists, 28 physicists, and 16 biologists are to be split into equal sized teams, so that each team has the same ratio of chemists, physicists and biologists. What is the maximum number of teams which can be made in this way?

Answer …….

Question 6

If $a = 7$, $b = -3$ and $c = 5$, find the value of the following expressions

(a) $c - ab$

Answer .....

(b) $\frac{ab^2}{c}$

Answer .....

(c) $\frac{3b}{2(a+c)}$

Answer .....

Question 7 Fully simplify the following algebraic expressions

(a) $7a + 4b - a - 12b$

Answer …….

(b) $5x - 3x - 7 + x^2 - 12$

Answer …….

(c) $5pq + 4p - 2q + 6p$

Answer …….

(d) $(3x)^2 \times 2xy$

Answer …….

Question 8 Solve the following equations, leaving your answers as improper fractions where necessary.

(a) $5x - 7 = 48$

Answer .....

(b) $\frac{3x}{4} + 2 = 8$

Answer .....

(c) $7(3x - 4) = -70$

Answer .....

(d) $4x - 5 = 43 - 10x$

Answer .....

(e) $\frac{5x-3}{6} = 12$

Answer .....

(f) $3x + \frac{2}{7} = 3 - \frac{3}{4}x$

Answer .....

Question 9

For the following questions you must form and solve an equation.

(a) I think of a number, subtract fifteen, then multiply the result by 6; I now have 48. What was the number I thought of?

Equation …….

Solution …….

(b) Jimmy is five years older than Robert. John is three years short of being twice Robert's age. The total of their ages is 78. How old is Robert?

Equation …….

Solution …….

Question 10

A bag contains a mixture of red and yellow beads. There are 40 beads in total, and there are 4 more yellow beads than red beads.

a) What is the ratio of red beads to yellow beads? Give your answer in its simplest form.

Answer …….

An equal number of red and yellow beads are added to the bag, so that there are still 4 more yellow beads than red beads. The ratio of red to yellow beads is now 13:15.

b) How many beads were added?

Answer …….

Question 11

Janice bought a vase, a painting, and a desk at a car boot sale. She took the items to an antiques shop to sell them.

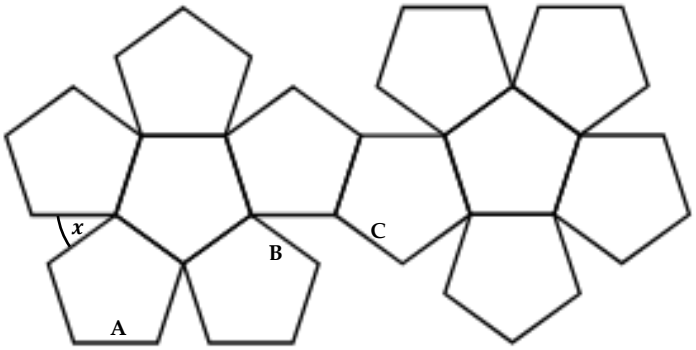
- Janice originally paid £75 for all three items.
- The vase sold for £25, which is £5 more than Janice paid for it.
- The painting cost Janice £15, but she sold it at two thirds that price.
- The desk sold for 15% more than Janice paid for it.

Calculate the overall percentage profit that Janice made.

Answer …….

Question 12

The diagram below shows the net of a dodecahedron, a 3D shape made up of 12 regular pentagons.



(a) One of the edges is marked with the letter A. Mark on the diagram the edge which will line up with A when the net is folded up to make a dodecahedron. Label the edge A′.

(b) Find the size of the angle marked x. You must state any angle rules which you use.

Answer …….

(c) Determine whether the lines marked B and C are parallel. Your answer must be supported by calculations and angle reasons; a simple "yes" or "no" will receive no marks.

Answer …….