

## 13+ Mathematics Entrance Examination

### Guidance

The Mathematics entrance examination is designed to give students an opportunity to show how confidently they can use the mathematics they have learned up to the end of Year 7. The paper looks not only at pupils' ability to carry out calculations accurately, but also at how well they can apply their knowledge to unfamiliar problems. Strong performance relies on clear thinking, careful reasoning and a secure understanding of key mathematical ideas.

The examination lasts 45 minutes and is taken without the use of a calculator. Students are therefore expected to be fluent in mental and written methods and to show all necessary working clearly. The paper is worth 75 marks in total, with marks available for sensible methods even when a final answer is incorrect.

The mathematical content of the paper is drawn largely from the Year 5 and Year 6 National Curriculum. Students should be comfortable working with number, including fractions, decimals and percentages, as well as basic algebra, ratio and proportion, measures, geometry and averages. Some questions may require students to draw on more than one area of mathematics within the same problem.

The structure of the paper encourages good time management. Questions generally increase in difficulty as the paper progresses. Earlier questions tend to focus on core skills and straightforward application, while later questions place greater emphasis on problem-solving and logical reasoning. Some questions are set in everyday contexts and may have several parts.

Students must show clear and organised working throughout the paper. Accurate mathematical notation is important, and students should be encouraged to set out their answers logically. If a question proves difficult, it is best to move on and return to it later, rather than spending too much time on one problem at the expense of others.



## Example questions

1. Work out the value of the following:

(a)  $8 - 4 \times 3$

(b)  $0.5 \times 0.4$

(c)  $0.006 \div 3$

2. A pen costs 20p to make.

(a) The shop sells the pen for a 30% profit. How much does the pen sell for?

(b) A notebook is sold for 24p more than it cost to make. This represents a 20% profit. How much did the notebook cost to make?

3. Work out the following, giving your answers in simplest form:

(a)  $3\frac{1}{2} \div 1\frac{3}{4}$

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

(c)  $\frac{3}{4} \times 2\frac{2}{5}$

4. Solve the following equations:

(a)  $5x - 7 = 18$

(b)  $2(3x + 4) + x = 36$

5. Given that  $p = 5, q = 7, r = -4$  work out the value of  $T$  if

(a)  $T = \frac{1}{3}(p + q)$

(b)  $T = qr - 2p^2$

(c)  $T = \frac{3q+11}{r^3}$

6. Given that  $213 \times 484 = 103092$  find the value of the following, giving your answer as a decimal.

(a)  $2130 \times 4.84$

(b)  $1.03092 \div 0.0213$

(c)  $103.092 \div 2.42$

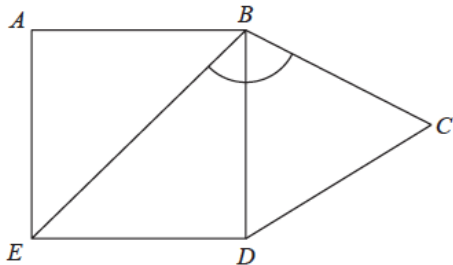
7. A smoothie is made from fruit, yoghurt and juice in the ratio 3 : 2 : 5.

(a) If the total mixture has a mass of 500 g, how much yoghurt is used?

(b) If only 200 g of juice is available, how much mixture can be made in total?

(c) What fraction of the mixture is fruit?

8. The diagram shows a square  $ABDE$  and an equilateral triangle  $BCD$ .



Work out the size of angle  $EBC$ .

9. Point  $A$ , with coordinates  $(2, 3)$ , and point  $B$ , with coordinates  $(6, 7)$ , lie on a straight line.

(a) Find the coordinates of the point halfway between  $A$  and  $B$ .

(b)  $A$  and  $B$  are two vertices of a square. Find the coordinates of the remaining two vertices of the square. There are three possible solutions.

10.

The number line below has markings equally spaced.

Find the missing number which should go where the arrow is on the number line.

