



*Rewarding Learning*

General Certificate of Secondary Education  
November 2024

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--

---

## Mathematics

Unit M8 Paper 2  
(With Calculator)

Higher Tier



<b>MV18</b>
-------------

[GMC82]

**THURSDAY 21 NOVEMBER, 10.45 am–12 noon**

---

### Time

1 hour 15 minutes, plus your additional time allowance.

### Instructions to Candidates

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

**You must answer the questions in the spaces provided.**

**Do not write on blank pages or tracing paper.**

Complete in black ink only. **Do not write with a gel pen.**

Questions which require drawing or sketching should be completed using an HB pencil.

All working **must** be clearly shown in the spaces provided.

Marks may be awarded for partially correct solutions.

You **may** use a calculator for this paper.

Answer **all fourteen** questions.

## **Information for Candidates**

The total mark for this paper is 50.

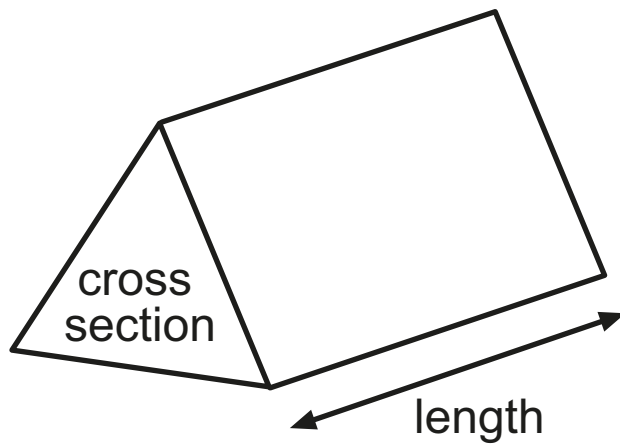
Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

You should have a calculator, ruler, compasses and a protractor.

The Formula Sheet is on pages 3 and 4.

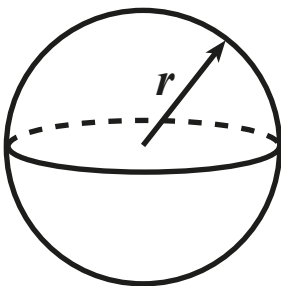
# Formula Sheet

**Volume of prism** = area of cross section  $\times$  length



**Volume of sphere** =  $\frac{4}{3} \pi r^3$

**Surface area of sphere** =  $4 \pi r^2$



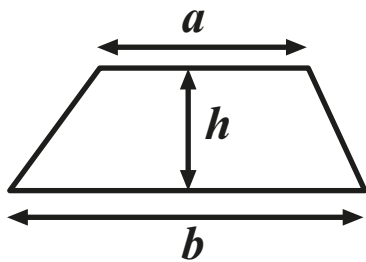
## Quadratic Equation

The solutions of  $ax^2 + bx + c = 0$

where  $a \neq 0$ , are given by

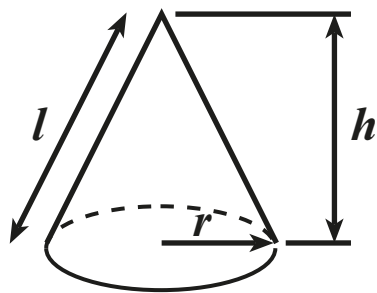
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

**Area of trapezium**  $= \frac{1}{2} (a + b)h$

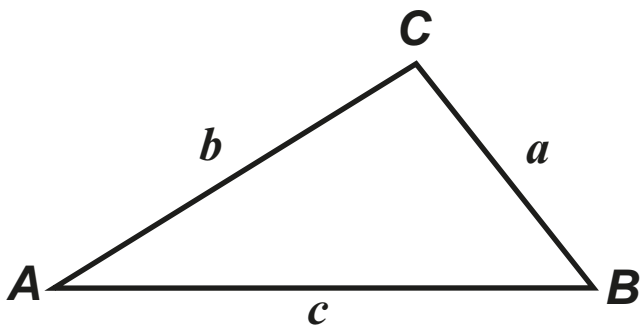


**Volume of cone**  $= \frac{1}{3} \pi r^2 h$

**Curved surface area of cone**  $= \pi r l$



**In any triangle  $ABC$**



**Sine Rule:**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

**Cosine Rule:**  $a^2 = b^2 + c^2 - 2bc \cos A$

**Area of triangle**  $= \frac{1}{2} ab \sin C$

1 There are 55 girls and 20 boys in Year 13

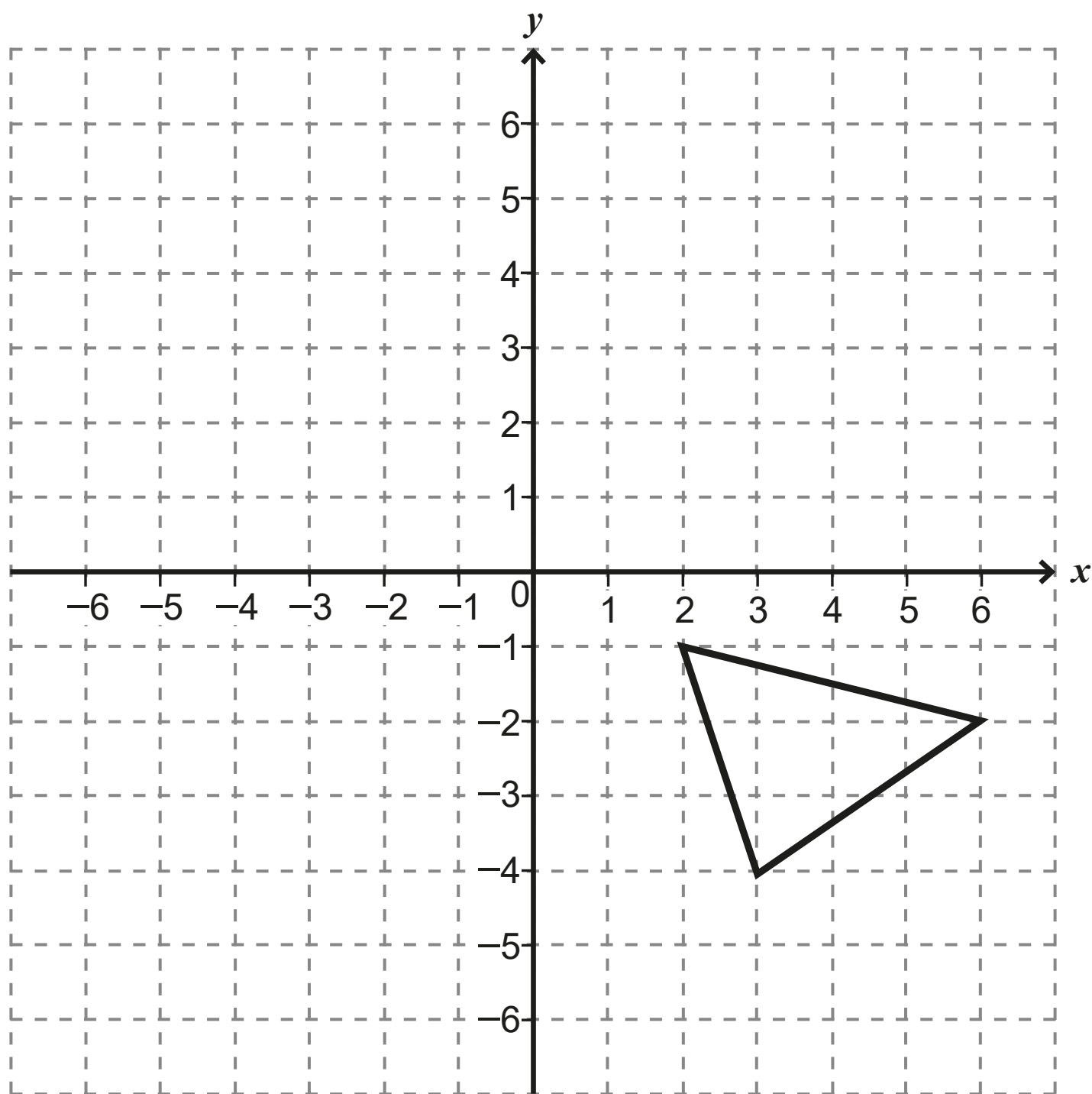
The probability that a girl in Year 13 has a part-time job is  $\frac{2}{5}$

The probability that a boy in Year 13 has a part-time job is  $\frac{3}{4}$

Work out the probability that a student in Year 13 has a part-time job. [4 marks]

Answer \_\_\_\_\_

**2** Rotate the triangle  $180^\circ$  about the point  $(3,1)$  [2 marks]

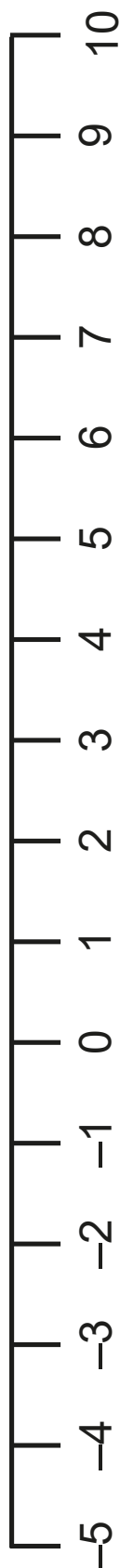




4 Solve the inequality

$$-5 < 2n \leq 8$$

showing all possible **integer** values for  $n$  on the number line below. [2 marks]



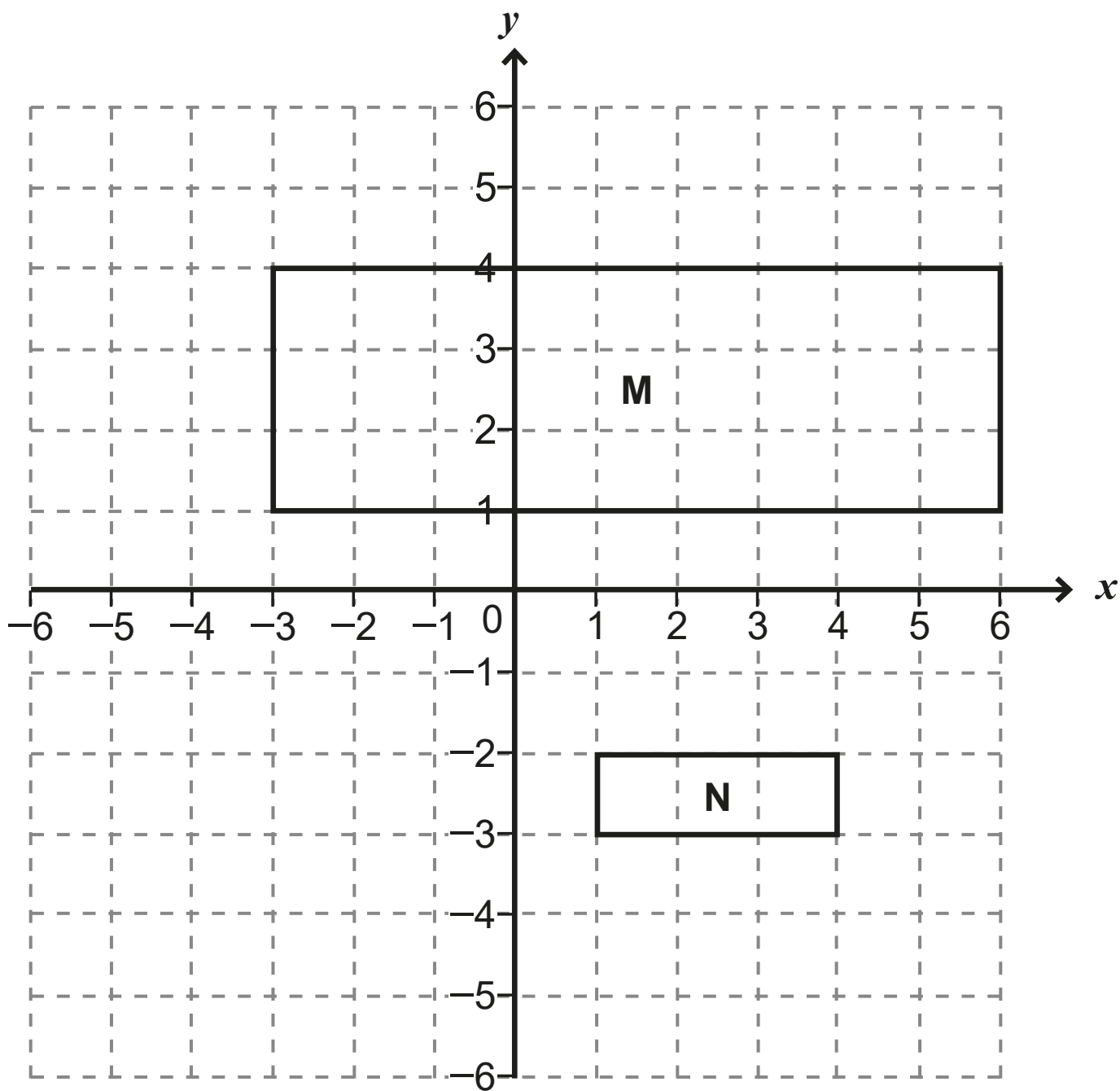


**5** Fill in the blank below. [1 mark]

The dimensions of a large cylinder are twice the dimensions of a small cylinder.

The large cylinder will hold \_\_\_\_\_ times as much as the small cylinder.

- 6 Describe fully the single transformation that maps **M** to **N**.  
[3 marks]



Answer \_\_\_\_\_

\_\_\_\_\_

**Blank Page**  
**(Questions continue overleaf)**

## 7 A restaurant has three courses on its menu

### **Starter**

Soup

Brie

Prawns

Pâté

### **Main**

Beef

Chicken

Salmon

Lasagne

Pork

### **Dessert**

Apple tart

Pavlova

Lemon cake

Ice cream

Rhubarb crumble

Fruit salad

There is a special deal when any two courses are ordered.

How many options are there when **any two different** courses are ordered? [3 marks]

Answer \_\_\_\_\_

8 Find the  $n$ th term of the sequence [2 marks]

$$\frac{1}{2}, \frac{8}{3}, \frac{27}{4}, \frac{64}{5}, \frac{125}{6}, \dots$$

Answer \_\_\_\_\_

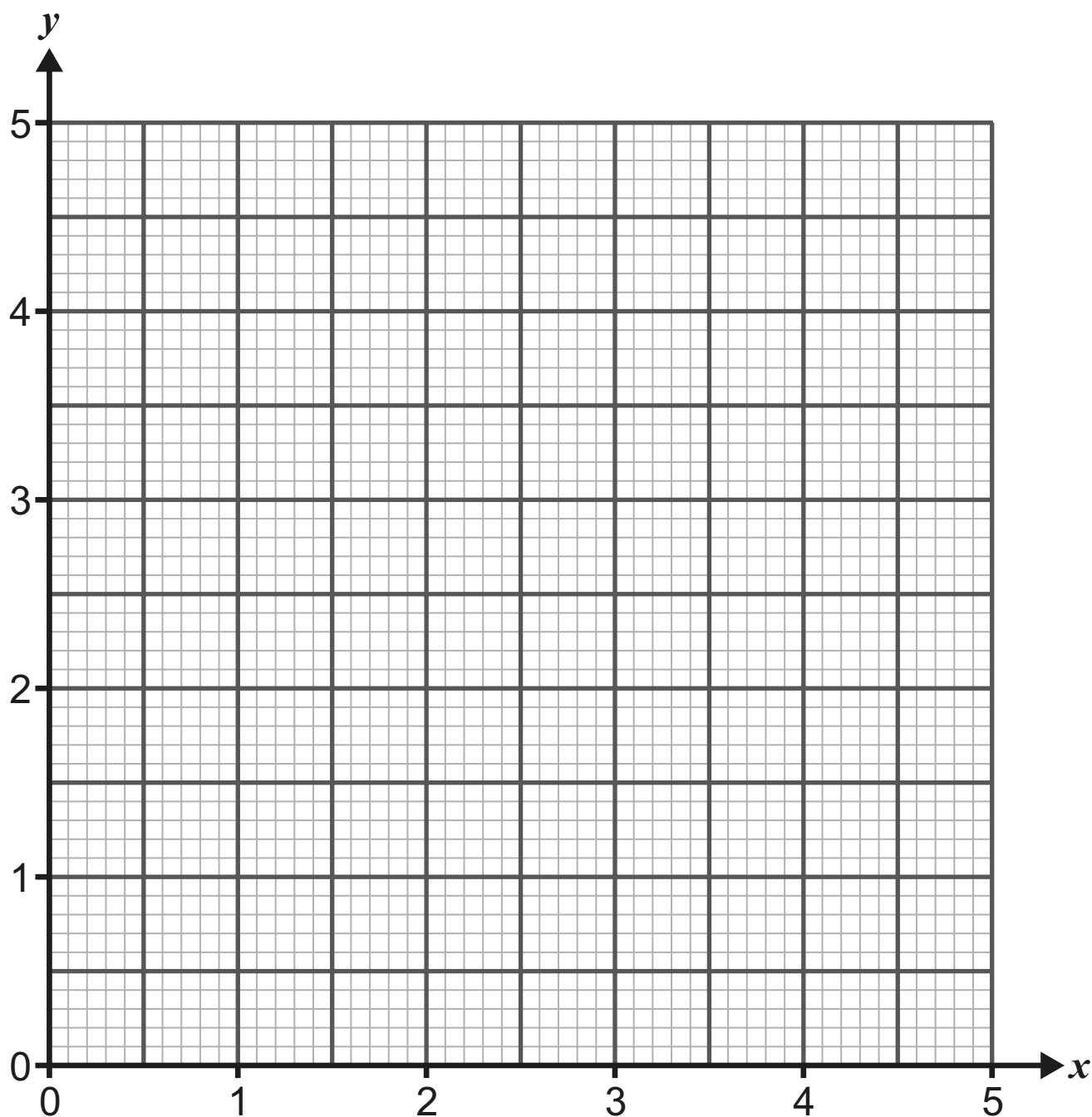
9 The probability that Eric will win his next darts match is  $\frac{1}{7}$

The probability that Fiona will win her next darts match is  $\frac{1}{5}$

What is the probability that they will both lose their next match? [2 marks]

Answer \_\_\_\_\_

- 10 (a)** Sketch the graph of  $y = (1.3)^x$  for values of  $x$  between 0 and 5 [3 marks]





- (b) Use your graph to estimate the increase in  $x$  required to double the value of  $y$ . [1 mark]

Answer \_\_\_\_\_

- (c) Which of the following is represented by the graph, where  $x$  is the number of years? [1 mark]

- A**  $y$  increases in value by 3% each year.
- B**  $y$  increases in value by 1.3% each year.
- C**  $y$  increases in value by 13% each year.
- D**  $y$  increases in value by 30% each year.

Answer \_\_\_\_\_

**11 (a)**  $y$  is inversely proportional to the square of  $x$ .

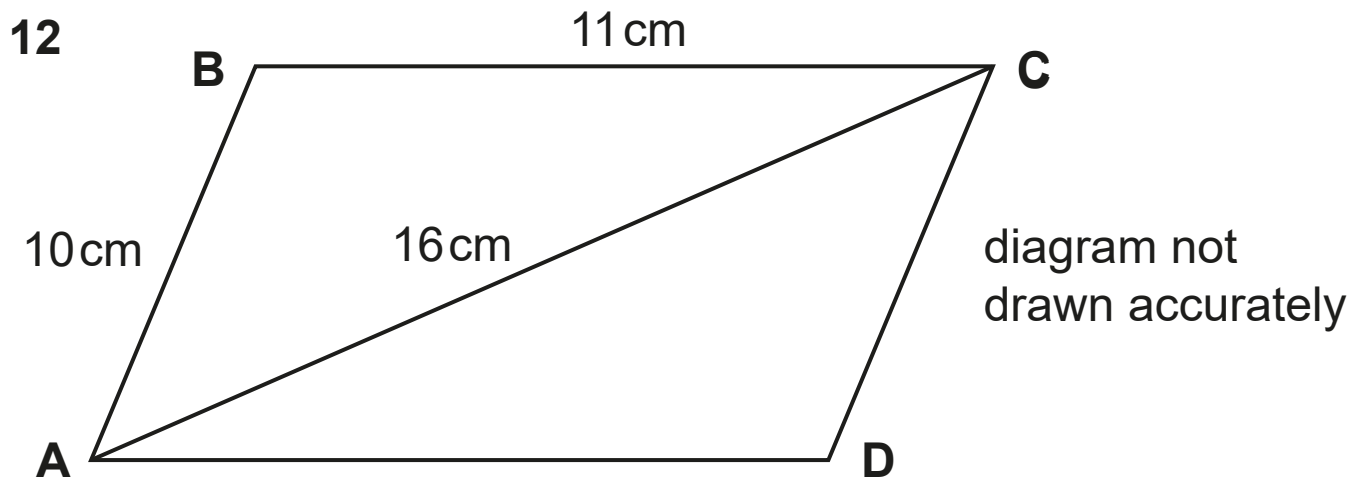
When  $x = 15$ ,  $y = 4$

Write  $y$  in terms of  $x$ . [3 marks]

Answer  $y =$  \_\_\_\_\_

**(b)** Hence find the values of  $x$  for which  $y = 10\,000$   
[2 marks]

Answer \_\_\_\_\_

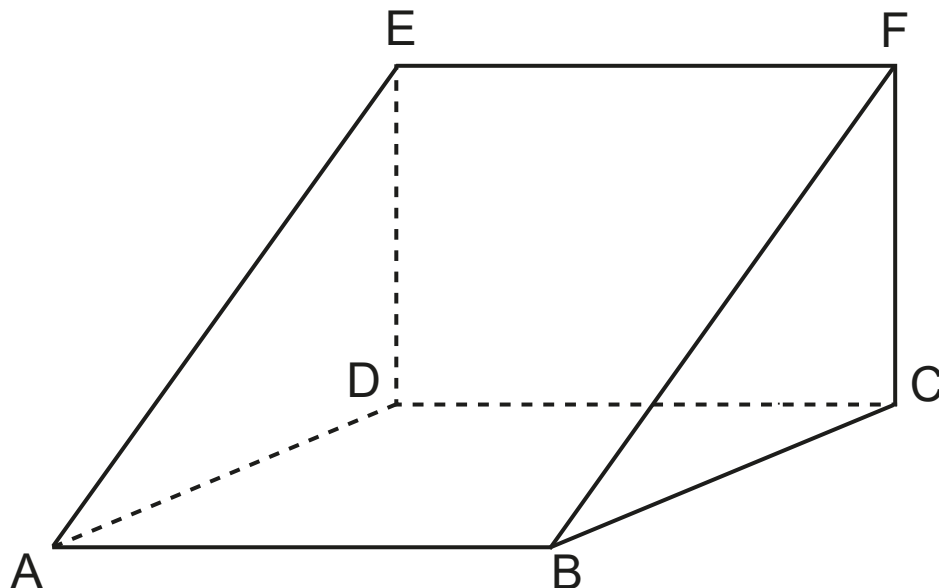


The parallelogram ABCD has sides  $AB = 10\text{ cm}$ ,  $BC = 11\text{ cm}$  and diagonal  $AC = 16\text{ cm}$ .

Find the area of the parallelogram. [5 marks]

Answer \_\_\_\_\_  $\text{cm}^2$

13



ABCDEF is a right-angled triangular prism.

$BC = 5\text{ cm}$ ,  $BF = 10\text{ cm}$  and  $AC = 15\text{ cm}$ .

Show that the angle between AF and ABCD is half the angle between ABCD and ABFE. [6 marks]

**14** A box contains eight cards numbered 1, 2, 3, 4, 5, 6, 7, 8 (a different number on each card).

One card is taken at random from the box and not replaced.

A second card is taken at random from the box.

The numbers on the two cards are multiplied together.

What is the probability that the answer is

**(a)** a prime number; [3 marks]

Answer \_\_\_\_\_

(b) a square number? [3 marks]

Answer \_\_\_\_\_

---

**This is the end of the question paper**

---

SOURCES

All images © CCEA unless stated

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
Total Marks	

Examiner Number

Permission to reproduce all copyright material has been applied for.  
In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA will be happy to rectify any omissions of acknowledgement in future if notified.