Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2024

Mathematics

StemUp Model Solution

Unit M7 Paper 1
(Non-Calculator)
Higher Tier

[GMC71]



GMC71

MONDAY 3 JUNE, 9.15 am–10.30 am

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

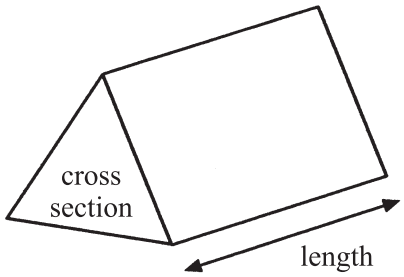
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page, on blank pages or tracing paper.
Complete in black ink only. **Do not write with a gel pen.**
Answer **all sixteen** questions.
All working should be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.
You **must not** use a calculator for this paper.

INFORMATION FOR CANDIDATES

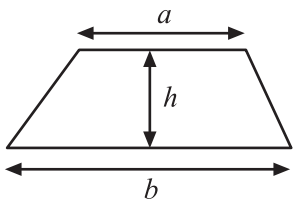
The total mark for this paper is 50.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a ruler, compasses and a protractor.
The Formula Sheet is on page 2.

Formula Sheet

Volume of prism = area of cross section × length

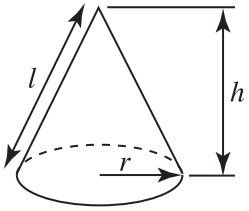


Area of trapezium = $\frac{1}{2}(a+b)h$



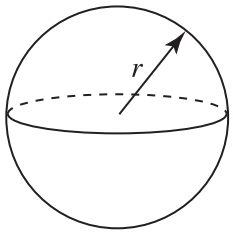
Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl

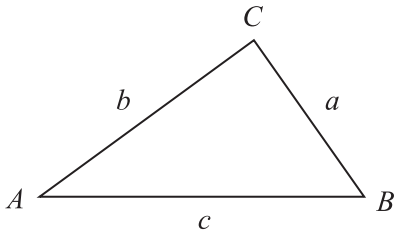


Volume of sphere = $\frac{4}{3}\pi r^3$

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



In any triangle *ABC*



Quadratic Equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

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

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 = $\frac{1}{2}ab\sin C$

14389

stemup.co.uk

1 6% of pupils at Marley Middle School are 6 feet tall or taller.

There are 700 pupils at the school.

How many pupils are **under** 6 feet tall?

1% of 700 = 700 ÷ 100 = 7

6% of 700 = 6 × 7 = 42

Under 6 feet = 700 − 42 = 658

Answer 658 [3]

[Turn over

2 Jim wants to buy 2 adult tickets and 3 child tickets for a show.

An adult ticket costs £29.90

A child ticket costs £14.95

Jim has £100 to spend.

Use an **estimation method** to calculate if Jim has enough money.

Show all your working.

Adult ≈ £30, child ≈ £15

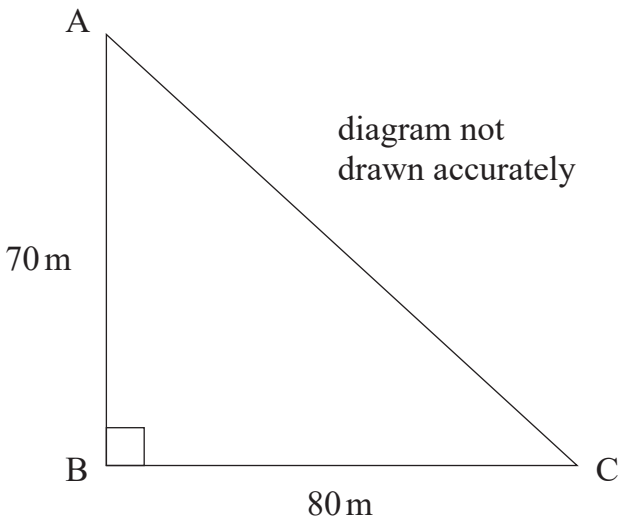
2 × 30 + 3 × 15 = 60 + 45 = £105

£105 > £100, so not enough money

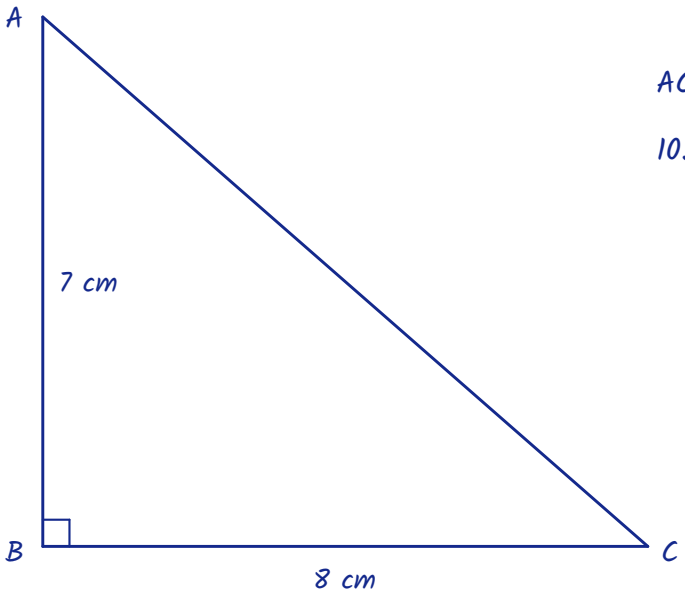
Does Jim have enough money? Answer No [2]

3 Draw a scale drawing to work out the actual length of the side AC of the triangle.

Use the scale 1 cm = 10 m



70 m → 7 cm, 80 m → 8 cm



AC measures 10.6 cm

10.6 × 10 = 106 m

Answer 106 m [3]

[Turn over

stemup.co.uk

4 A fair spinner has three equal sections labelled A, B and 4

It is spun twice.

(a) Complete the table to show all the possible outcomes.

	A	**B**	**4**
A	(A, A)	(A, B)	(A, 4)
B	(B, A)	(B, B)	(B, 4)
4	(4, A)	(4, B)	(4, 4)

[2]

(b) What is the probability of getting (4, 4)?

Answer $\frac{1}{9}$ [1]

5 **(a)** Jeff earns £72 for 4 hours of tutoring.

How much does he earn for 10 hours of tutoring?

72 ÷ 4 = £18 per hour

18 × 10 = £180

Answer £ 180 [2]

(b) A shop uses the following ingredients to make an ice cream sundae.

Ice cream	3 scoops
Sprinkles	4 spoonfuls
Whipped cream	2 tablespoons

How many scoops of ice cream were used on a day when they used 24 spoonfuls of sprinkles to make sundaes?

24 ÷ 4 = 6 sundaes

6 × 3 = 18 scoops

Answer 18 [2]

[Turn over

6 A café owner works out the probability of customers buying a drink with their meal.

Drink	Water	Milk	Hot drink	Other	None
Probability	0.24	0.19	0.3	0.15	0.12

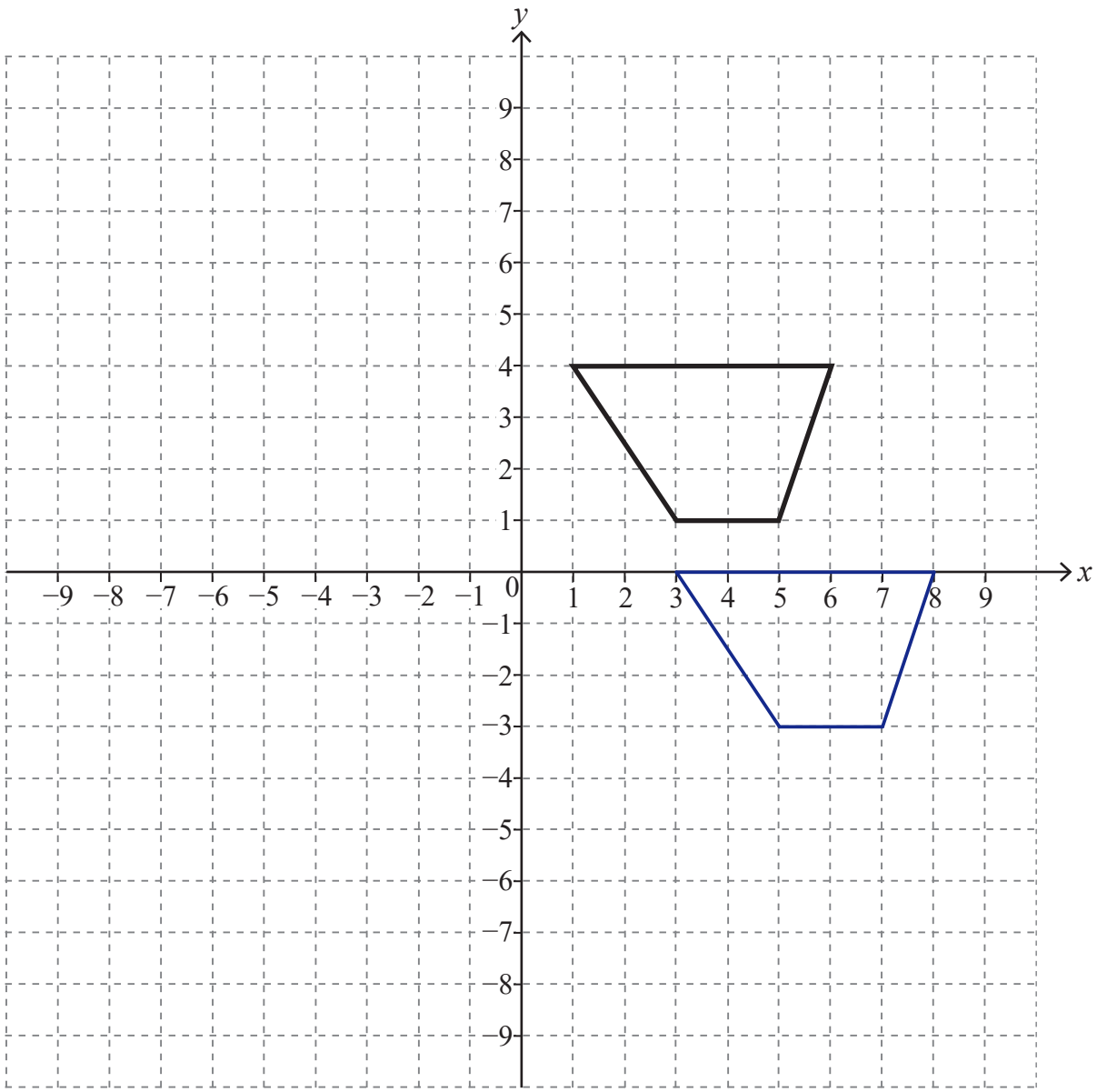
What is the probability that a customer, chosen at random, buys milk?

$1 - (0.24 + 0.3 + 0.15 + 0.12)$

$= 1 - 0.81 = 0.19$

Answer 0.19 [2]

7 Translate the shape 2 to the right and 4 down.



[2]

[Turn over

stemup.co.uk

8 In a box there are bronze, silver and gold medals.

There are 21 bronze and 42 silver medals.

A medal is taken at random from the box.

The probability of taking a gold medal is $\frac{3}{10}$

How many **gold** medals are there?

$P(\text{not gold}) = 1 - \frac{3}{10} = \frac{7}{10}$

Bronze + silver = 21 + 42 = 63

$\frac{7}{10}$ of total = 63, so $\frac{1}{10}$ of total = 63 ÷ 7 = 9

Total = 9 × 10 = 90

Gold = 90 − 63 = 27

Answer 27 [3]

9 John spends x hours each week on homework.

Joanne spends 3 hours more than John each week on homework.

In total they spend more time on homework each week than Sam, who spends 14 hours per week on homework.

Write down an inequality and solve it for x.

John = x, Joanne = x + 3

x + x + 3 > 14

2x + 3 > 14

2x > 11

x > 5.5

Answer x + x + 3 > 14, x > 5.5 [3]

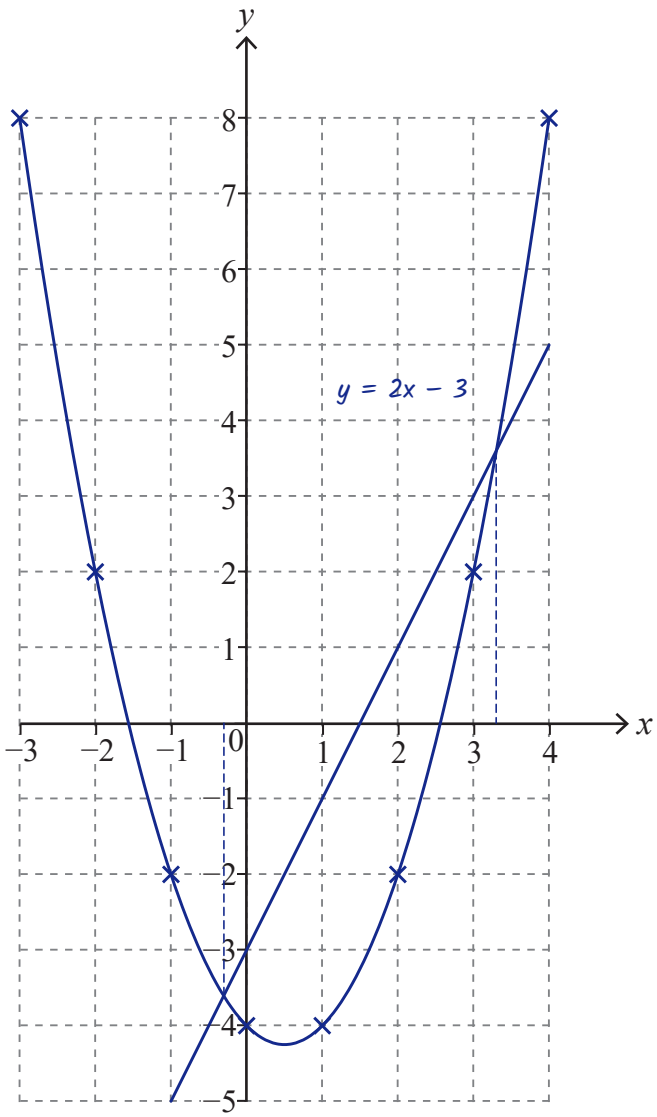
[Turn over

10 (a) (i) Complete the table for $y = x^2 - x - 4$

x	−3	−2	−1	0	1	2	3	4
y	8	2	−2	−4	−4	−2	2	8

[2]

(ii) Hence draw the graph of $y = x^2 - x - 4$ on the grid below.



[2]

(b) Use the graph to solve the equation $x^2 - x - 4 = 0$

Curve crosses the x-axis (y = 0) at

x ≈ −1.6 and x ≈ 2.6

Answer *x = −1.6 and x = 2.6* [1]

(c) **(i)** Draw the line $y = 2x - 3$ on the grid.

x = 0, y = −3; x = 4, y = 5

[1]

(ii) Use your graph to find the points of intersection of $y = x^2 - x - 4$

and $y = 2x - 3$

Read off where the line crosses the curve

Answer (*−0.3* , *−3.6*) , (*3.3* , *3.6*) [2]

[Turn over

11 Each interior angle of a regular polygon is 140°

How many sides does it have?

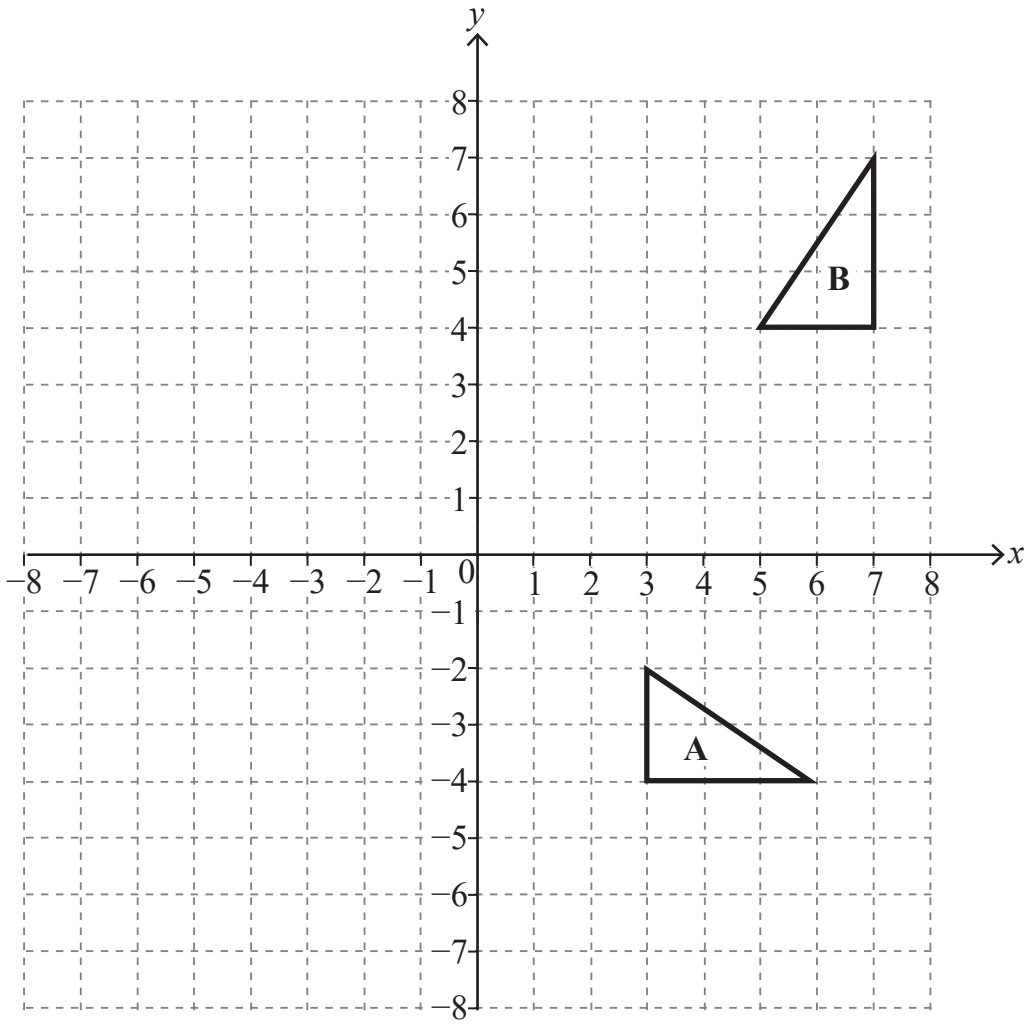
Exterior angle = 180° − 140° = 40°

Number of sides = 360 ÷ 40 = 9

Answer *9* [2]



12



Describe fully the **single** transformation which takes triangle **A** to triangle **B**.

Answer Rotation, 90° anticlockwise, about centre (1, 2)

[3]

[Turn over

13 A jeweller sells watch batteries at a fixed price and watch straps at a different fixed price.

On Monday he sold 1 battery and 3 straps for £40

On Tuesday he sold 2 batteries and 1 strap for £25

Calculate the price of a battery and the price of a strap.

A solution by trial and error will not be accepted.

Let battery = £b, strap = £s

$b + 3s = 40$ (1)

$2b + s = 25$ (2)

(1) × 2: $2b + 6s = 80$ (3)

(3) − (2): $5s = 55$, $s = 11$

$b + 3 \times 11 = 40$, $b = 40 - 33 = 7$

Answer Price of one battery £ 7

Price of one strap £ 11 [4]

stemup.co.uk

14 A lunch deal consists of a sandwich, a drink and a piece of fruit.

On Friday there are 5 choices of sandwich, 6 choices of drink and 4 choices of fruit.

On Saturday there are 6 choices of sandwich, 8 choices of drink and 3 choices of fruit.

How many more combinations are available on Saturday than on Friday?

Friday: $5 \times 6 \times 4 = 120$

Saturday: $6 \times 8 \times 3 = 144$

$144 - 120 = 24$

Answer 24 [3]

15 Which is heavier, **A** or **B**?

Show your working.

A	**B**
1.05×10^7 g	1.5×10^4 kg

A: 1.05×10^7 g $\div 1000 = 1.05 \times 10^4$ kg

B: 1.5×10^4 kg

1.5×10^4 kg $> 1.05 \times 10^4$ kg, so B is heavier

Answer B [2]

[Turn over

16 A and B are similar shapes.

The area of A is 24 cm^2

The area of B is 96 cm^2

The height of B is 15 cm.

What is the height of A?

Area ratio A : B = 24 : 96 = 1 : 4

Length ratio A : B = √1 : √4 = 1 : 2

height of A = 15 ÷ 2 = 7.5 cm

Answer *7.5* cm [3]

THIS IS THE END OF THE QUESTION PAPER

stemup.co.uk

BLANK PAGE

DO NOT WRITE ON THIS PAGE

Sources: All images ©CCEA unless stated

DO NOT WRITE ON THIS PAGE

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
12	
16	
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.

stemup.co.uk