Rewarding Learning

General Certificate of Secondary Education

Centre Number

Candidate Number

Mathematics

StemUp Model Solution

Unit M7 Paper 2
(With calculator)
Higher Tier



GMC72

[GMC72]
Assessment

Assessment Level of Control:
Tick the relevant box (✓)

Controlled Conditions	
Other	

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

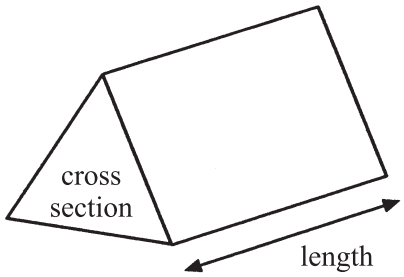
INFORMATION FOR CANDIDATES

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 calculator, ruler, compasses and a protractor.
The Formula Sheet is on page 2.

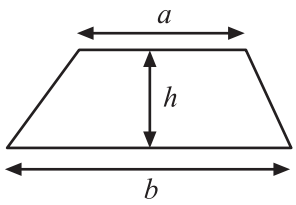
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Formula Sheet

Volume of prism = area of cross section × length

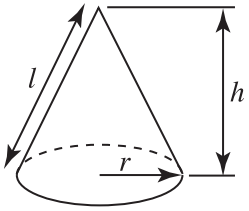


Area of trapezium = $\frac{1}{2}(a+b)h$



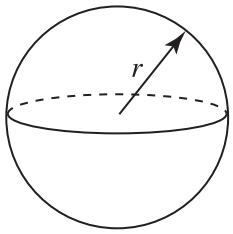
Volume of cone = $\frac{1}{3}\pi r^2 h$

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

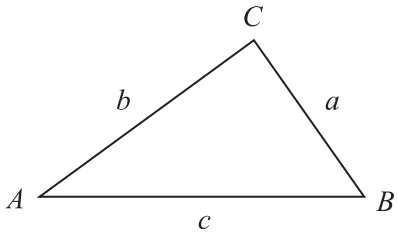


Volume of sphere = $\frac{4}{3}\pi r^3$

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

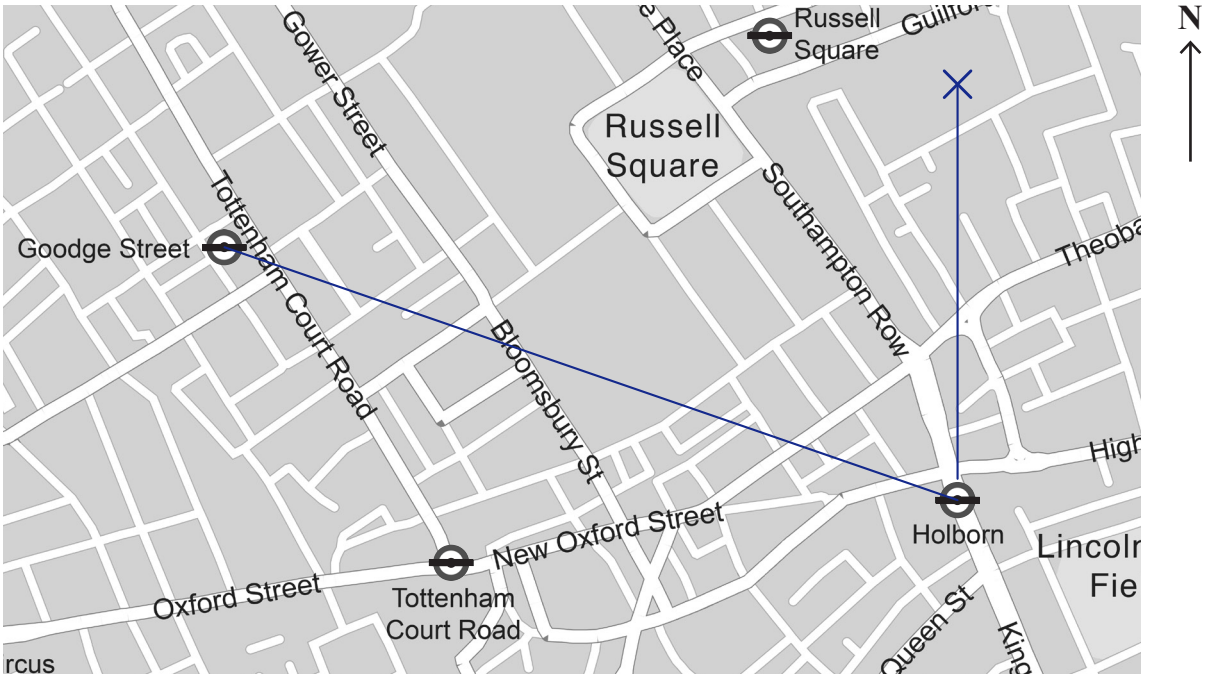
Area of triangle = $\frac{1}{2}ab\sin C$

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1 The map shows the position of four Underground Stations in London.

The symbol for an underground station is



Map Scale 1 cm = 100 m

(a) Calculate the **actual distance** between Goodge Street Underground Station and Holborn Underground Station.

Show your working clearly.

Distance on map = 10.3 cm
Actual distance = 10.3 × 100 = 1030 m

Answer *1030* m [2]

(b) Great Ormond Street Children's Hospital is 550 m due North of Holborn Underground Station.

Mark the exact position of the hospital with an X. [2]

550 m ÷ 100 = 5.5 cm due North of Holborn

[Turn over

2 Jenny's height is given as 156 cm, correct to the nearest cm.

Between what limits does Jenny's height lie?

Complete the following:



155.5 ⩽ Jenny's height < 156.5 [2]

3 Laura paid for meals, while on holiday in Spain, with her credit card.

The cost was €91.48

£1 = €1.12

(a) What was the cost in £?

91.48 ÷ 1.12 = 81.678...
= £81.68

Answer £ 81.68 [2]

(b) Laura's bank charged her 2.7% of this cost in £ for a non-sterling transaction.

How much was this charge in £?

2.7% of 81.68 = 0.027 × 81.68
= 2.20536 = £2.21

Answer £ 2.21 [2]

4 In a herd of 40 goats there are



8 brown 9 white 13 without horns

A goat is taken at random from the herd.

What is the probability that this goat

(a) has horns,

40 − 13 = 27 have horns

Answer $\frac{27}{40}$ [1]

(b) is brown or white,

8 + 9 = 17

Answer $\frac{17}{40}$ [1]

(c) is not brown or white?

40 − 17 = 23

Answer $\frac{23}{40}$ [1]

[Turn over

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5

	Pancake mix for four people	Pancake mix for ten people
Flour	200g	500 g
Milk	350ml	875 ml
Eggs	2	5
Vegetable oil	1 tablespoon	$2\frac{1}{2}$ tablespoons

The table above shows the ingredients required to make pancakes for four people.

Complete the table to show how much of each ingredient would be required for ten people. [2]

10 ÷ 4 = 2.5, so multiply each amount by 2.5
200 × 2.5 = 500 g 350 × 2.5 = 875 ml
2 × 2.5 = 5 eggs 1 × 2.5 = 2.5 tablespoons

6 **(a)** Fill in the next term in the following sequence.

2, 3, 5, 8, 13, 21, 34 [1]

(b) What rule did you use to find this term?

Answer Add the two previous terms together (13 + 21 = 34) [1]

[Turn over



7 A box contains sweets.

The sweets are strawberry, lime, orange or blackcurrant flavour.

A sweet is taken at random from the box.

The table below shows some of the probabilities.

Flavour	strawberry	lime	orange	blackcurrant
Probability	0.45	0.15	0.15	0.25

(a) The box has an equal number of lime and orange sweets.

Work out the probability that an orange sweet will be taken.

$1 - 0.45 - 0.25 = 0.3$
$0.3 \div 2 = 0.15$

Answer 0.15 [2]

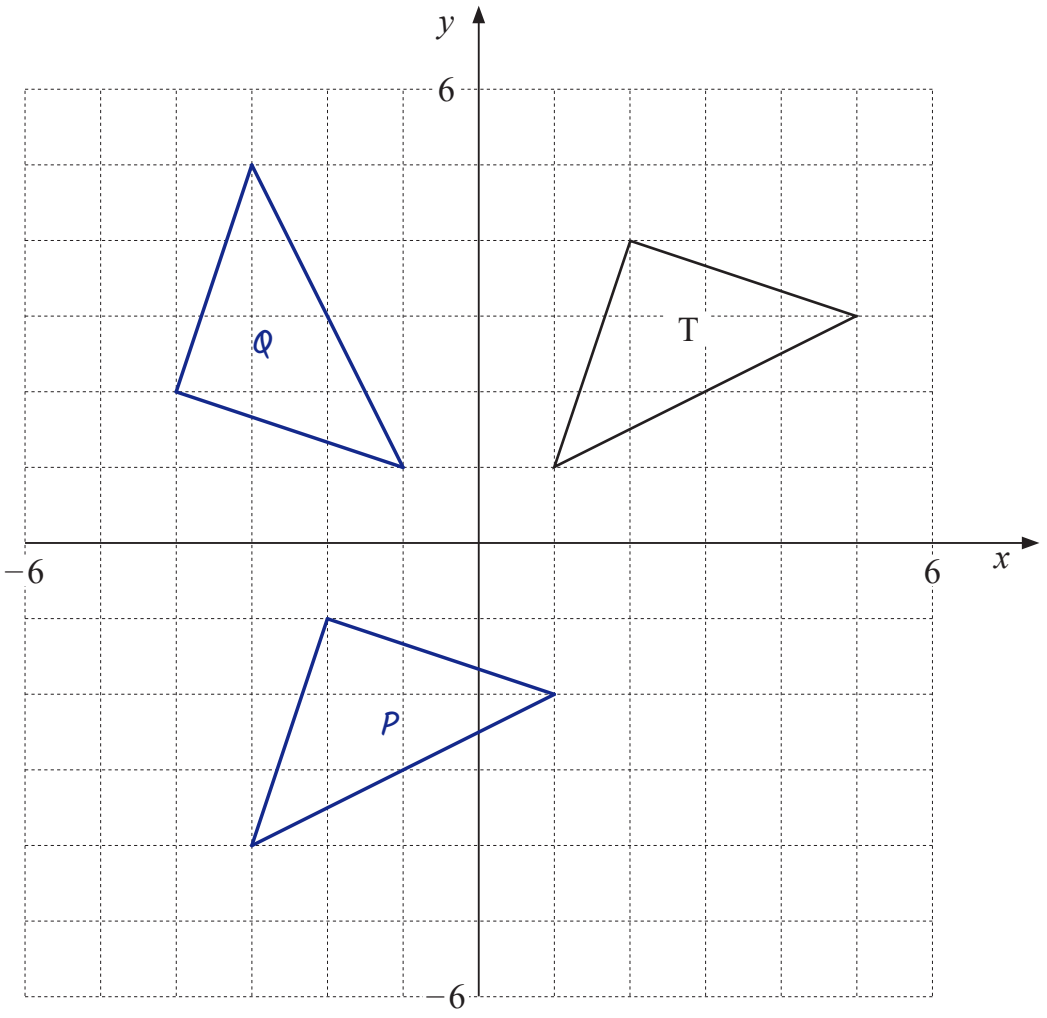
(b) The box contains a total of 120 sweets.

How many strawberry sweets should it contain?

$120 \times 0.45 = 54$

Answer 54 [2]

8

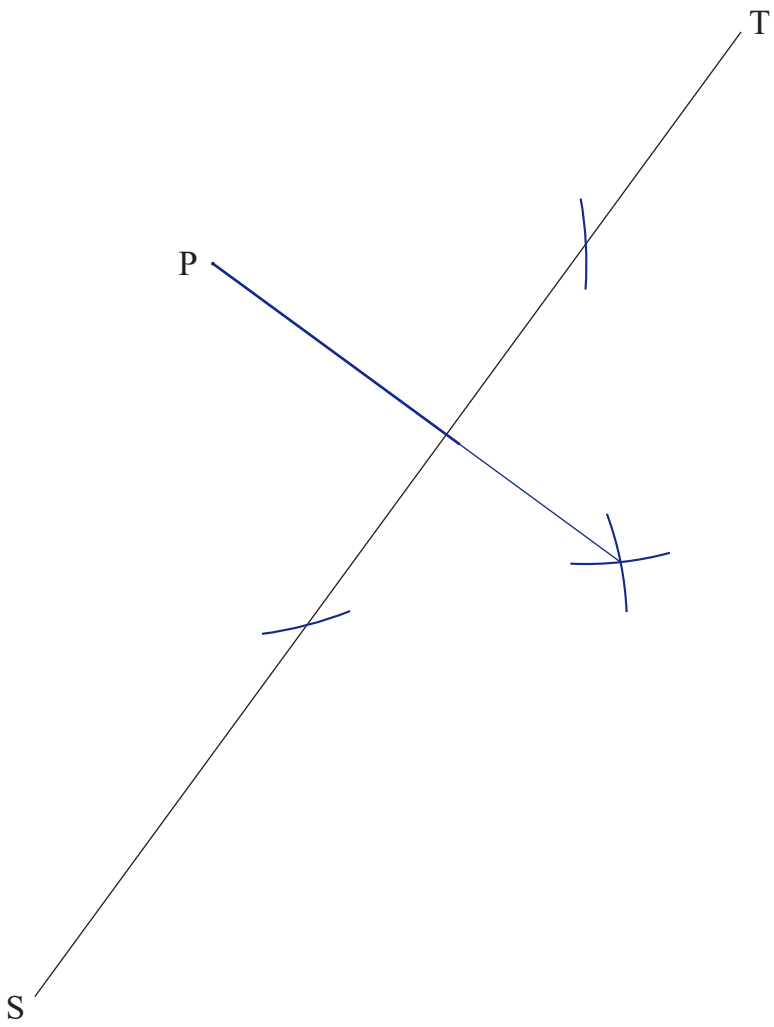


(a) Draw the image of the triangle, T, after a translation of 4 units to the left and 5 units down.
Label the image P. [1]

(b) Draw the image of the triangle, T, after a rotation of 90° anti-clockwise about the origin.
Label the image Q. [3]

[Turn over

9 Construct the line which represents the shortest distance from point P to the line ST in the diagram below.



[2]

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10 A solution to the equation $4x - x^3 - 2 = 0$ lies between $x = 0$ and $x = 1$

Use trial and improvement to find this solution, giving your answer correct to 1 decimal place.

Show all your working clearly.

x	$4x - x^3 - 2$	
0	−2	too small
1	1	too big
0.5	−0.125	too small
0.6	0.184	too big
0.55	0.033625	too big

Answer $x =$ 0.5 [3]

Solution lies between 0.5 and 0.55,
so x = 0.5 correct to 1 decimal place

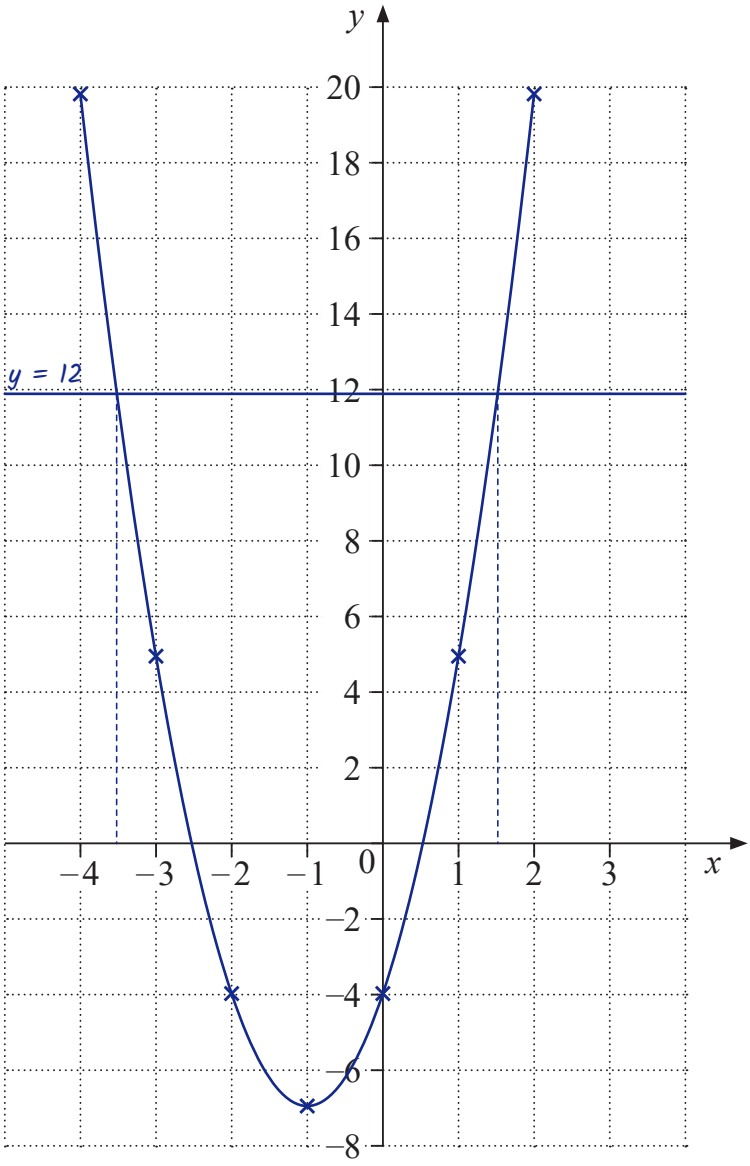
[Turn over

11 **(a)** Complete the table of values for $y = 3x^2 + 6x - 4$

x	−4	−3	−2	−1	0	1	2
y	20	5	−4	−7	−4	5	20

[1]

(b) Hence, draw the graph of $y = 3x^2 + 6x - 4$ on the grid below.



[2]

(c) Draw the line $y = 12$ on the grid.
Write down the x values of the points of intersection with this line.

Answer −3.5 , 1.5 [2]

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12 Write the binary number 1011001 as a decimal number.

64 32 16 8 4 2 1
1 0 1 1 0 0 1
= 64 + 16 + 8 + 1 = 89

Answer 89 [1]

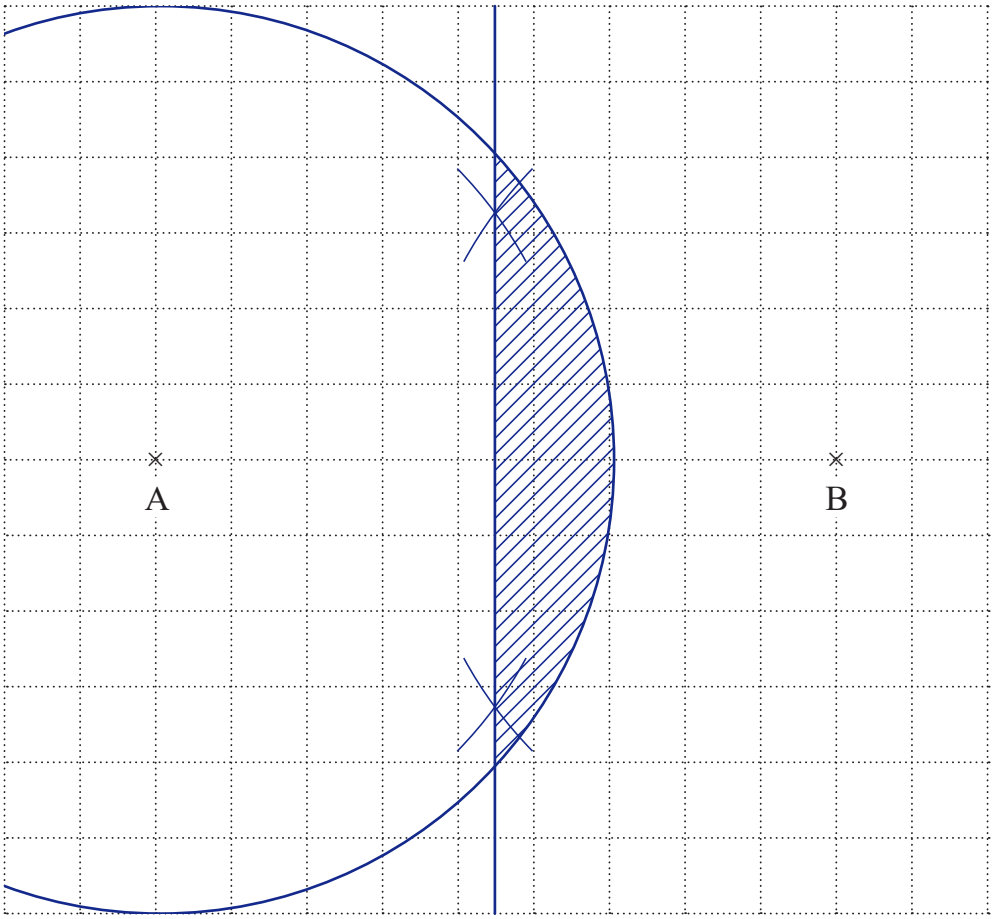
[Turn over



13 Two transmitters are located at points A and B, 9 metres apart.

The best reception is an area which is less than 6 metres from A and closer to B than to A.

Shade this area on a scale drawing below, using a scale of 1 cm to 1 metre.



[3]

Circle centre A, radius 6 cm (less than 6 m from A)
Perpendicular bisector of AB (closer to B than to A)

14 A piece of land in the shape of a rectangle has a length of 8.3×10^6 centimetres and a width of 3.7×10^4 centimetres.

(a) Work out the area of the land, giving your answer in standard form.

$8.3 \times 10^6 \times 3.7 \times 10^4 = 30.71 \times 10^{10}$

Answer 3.071×10^{11} cm^2 [1]

(b) Work out the perimeter of the land, giving your answer in standard form.

$2 \times (8.3 \times 10^6 + 3.7 \times 10^4)$
$= 2 \times 8\ 337\ 000 = 16\ 674\ 000$

Answer 1.6674×10^7 cm [2]

[Turn over

15 John earns £x per hour on Fridays and £y per hour on Saturdays.

In March he worked 20 hours on Fridays, 12 hours on Saturdays and earned £322

In April he worked 16 hours on Fridays, 10 hours on Saturdays and earned £262

Use simultaneous equations to find the values of x and y.

$20x + 12y = 322$ (1)

$16x + 10y = 262$ (2)

(1) × 5: $100x + 60y = 1610$

(2) × 6: $96x + 60y = 1572$

Subtract: $4x = 38$

$x = 9.50$

Substitute into (1): $20 \times 9.5 + 12y = 322$

$190 + 12y = 322$

$12y = 132$

$y = 11$

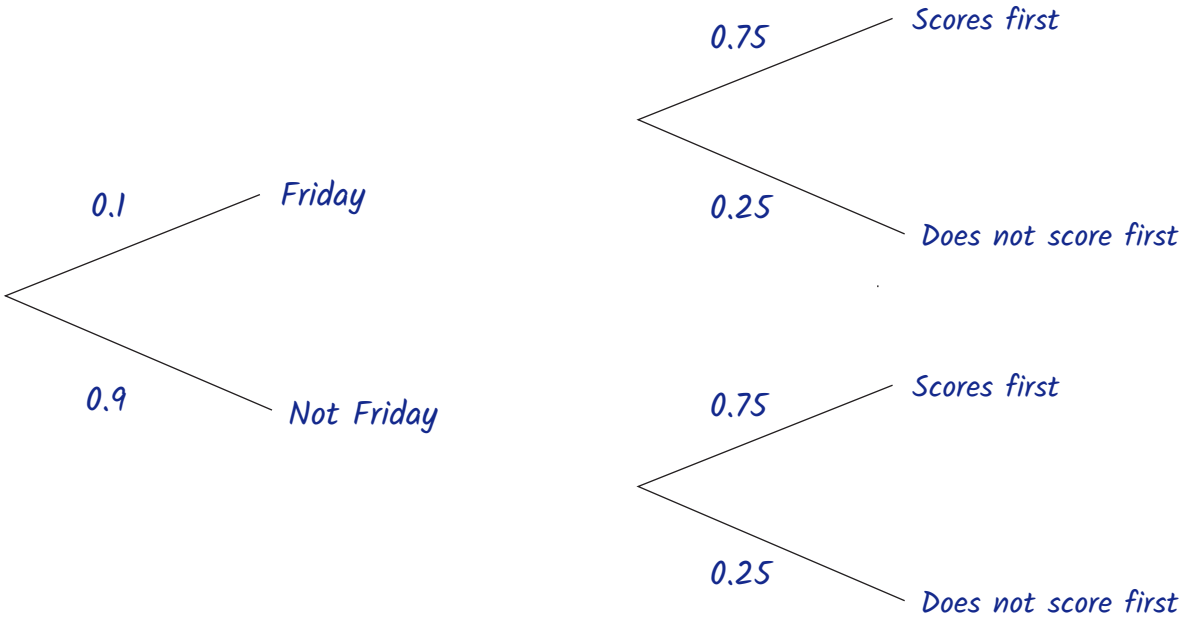
Answer $x =$ 9.50

$y =$ 11 [5]

16 The probability of Fran's team playing their weekly game on a Friday is 0.1

The probability of Fran's team scoring first in a game is 0.75

Show this information on the tree diagram.



[3]

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Question Number	**Marks**
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