

Name: \_\_\_\_\_

# Maths Genie Stage 9

## Test A

### Instructions

- Use **black** ink or ball-point pen.
- Answer all questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**
- **Calculators may not be used.**

### Information

- The marks for each question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end

1  $a = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$  and  $b = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$

Write down as a column vector  $2a + 3b$

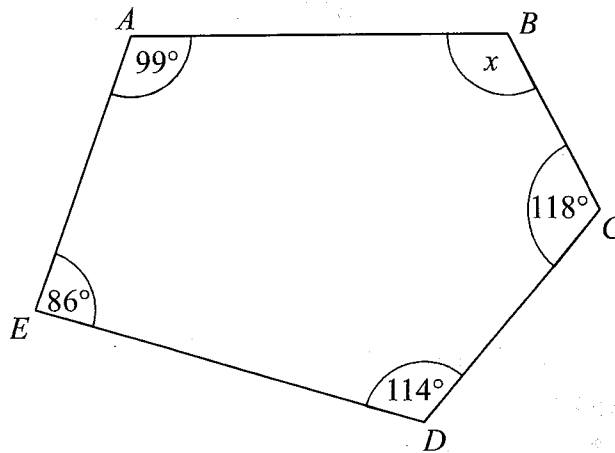
$$2 \begin{pmatrix} 3 \\ 4 \end{pmatrix} + 3 \begin{pmatrix} 2 \\ -5 \end{pmatrix}$$

$$\begin{pmatrix} 6 \\ 8 \end{pmatrix} + \begin{pmatrix} 6 \\ -15 \end{pmatrix} = \begin{pmatrix} 12 \\ -7 \end{pmatrix}$$

$$\begin{pmatrix} 12 \\ -7 \end{pmatrix}$$

(Total for Question 1 is 2 marks)

2



ABCDE is a pentagon.

Work out the size of angle BAF.

$$(5 - 2) \times 180 = 540$$

$$\begin{array}{r} 99 \\ 86 \\ 118 \\ + 114 \\ \hline 417 \end{array}$$

$$\begin{array}{r} 540 \\ - 417 \\ \hline 123 \end{array}$$

$$123$$

(Total for Question 2 is 2 marks)

3  $3a = 2b + 5c$

Make  $c$  the subject of the formula.

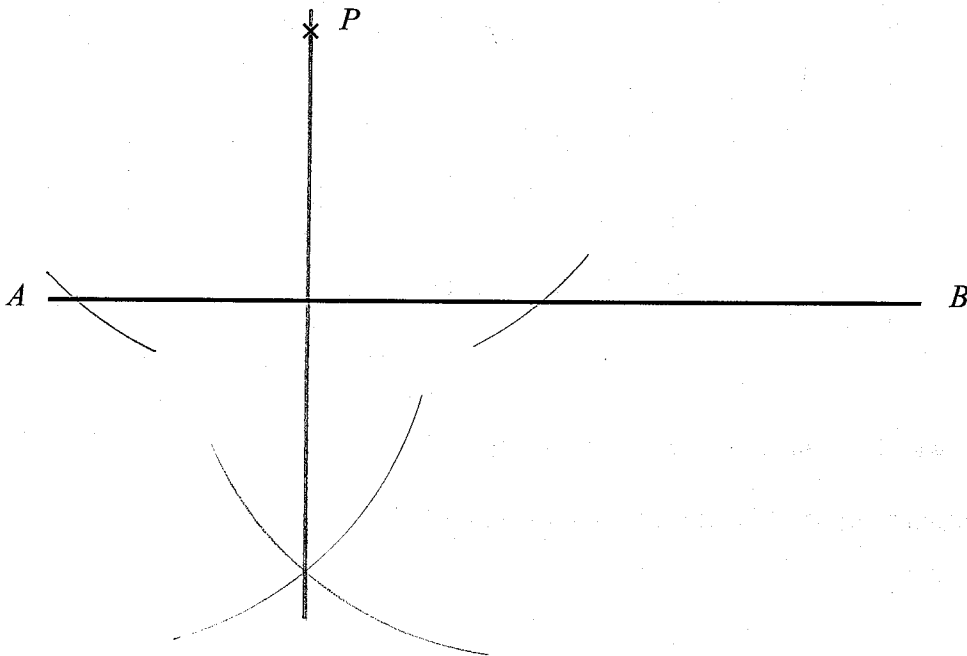
$$3a - 2b = 5c$$

$$\frac{3a - 2b}{5} = c$$

$$c = \frac{3a - 2b}{5}$$

(Total for Question 3 is 2 marks)

- 4 Use ruler and compasses to construct the perpendicular from point  $P$  to the line  $AB$ .  
You must show all your construction lines.



(Total for Question 4 is 2 marks)

5 A straight line has equation  $y = 5 - 2x$

(a) Write down the gradient of the line.

-2

(1)

(b) Write down the coordinates of the point where the line crosses the y axis.

(0, 5)

(1)

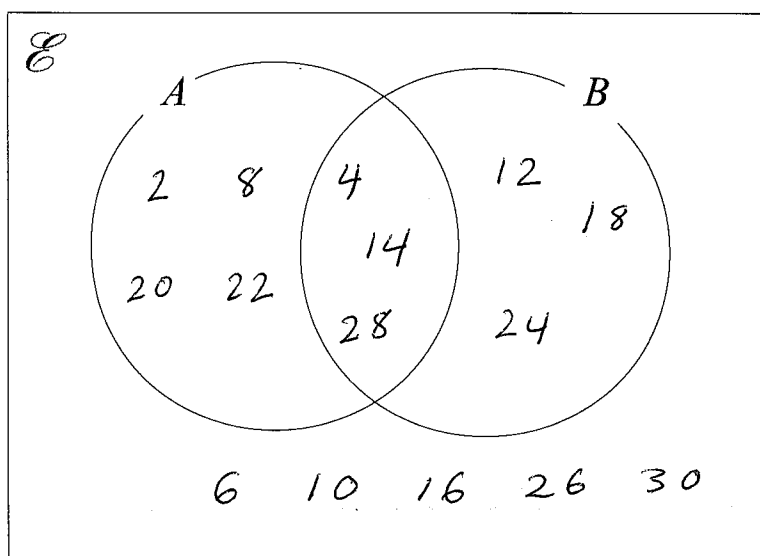
(Total for Question 5 is 2 marks)

6  $\mathcal{E} = \{\text{even numbers between 1 and 31}\}$

$A = \{2, 4, 8, 14, 20, 22, 28\}$

$B = \{4, 12, 14, 18, 24, 28\}$

(a) Complete the Venn diagram to represent this information.



(2)

A number is chosen at random from the universal set,  $\mathcal{E}$

(b) What is the probability that the number is in the set  $A \cup B$ ?

$\frac{10}{15}$  [or  $\frac{2}{3}$ ]

(2)

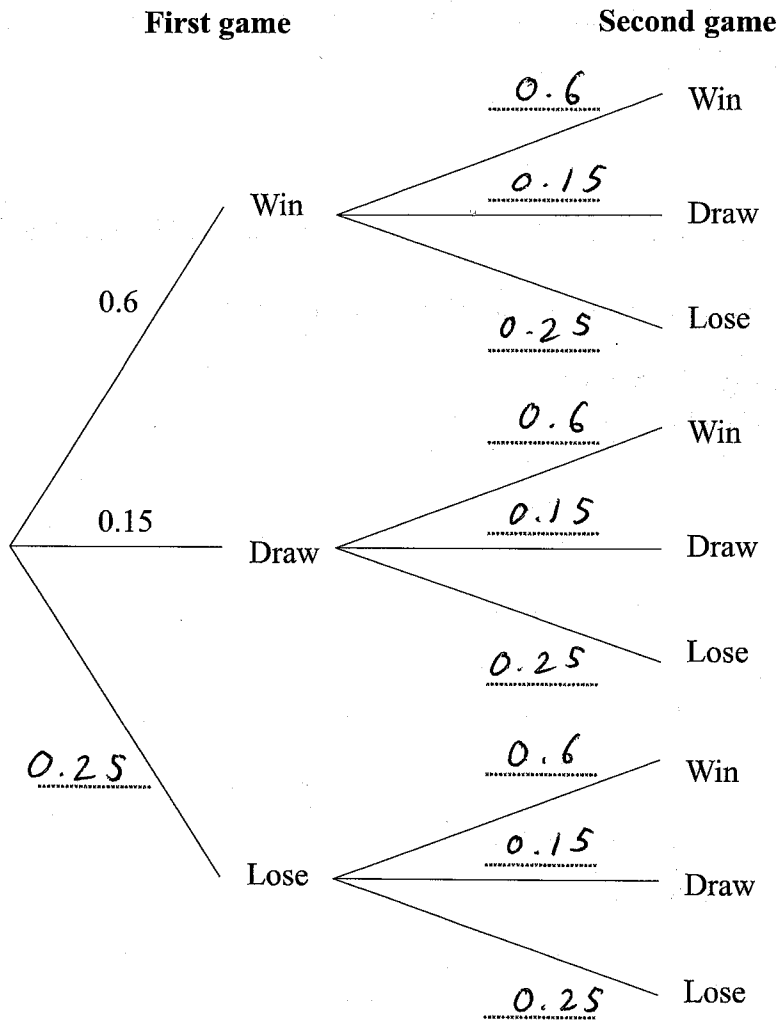
(Total for Question 6 is 4 marks)

7 Jon plays a game where he can win, draw or lose.

The probability Jon wins any game 0.6  
The probability Jon draws any game is 0.15

Jon plays two games.

(a) Complete the probability tree diagram



(b) Work out the probability Jon wins both games.

(2)

$$0.6 \times 0.6$$

$$0.36$$

(2)

(Total for Question 7 is 4 marks)

- 8 Find the gradient of the line that passes through (2, 12) and (5, 3).

$$x_1 \quad y_1 \quad x_2 \quad y_2$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{3 - 12}{5 - 2} = \frac{-9}{3} = -3$$

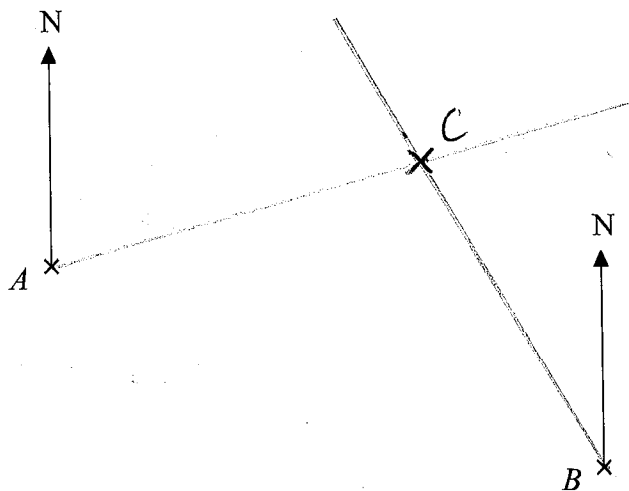
-3

(Total for Question 8 is 2 marks)

- 9 The accurate scale drawing shows the positions of boat A and boat B.

Boat C is on a bearing of  $075^\circ$  from A.

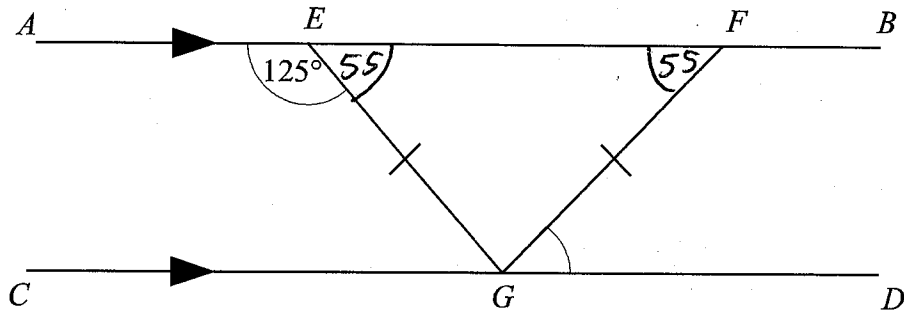
Boat C is on a bearing of  $330^\circ$  from B.



On the diagram, mark with a cross (x) the position of boat C on the diagram.

(Total for Question 9 is 2 marks)

10



$AB$  and  $CD$  are parallel lines.  
 $EFG$  is an isosceles triangle

Angle  $AEG = 125^\circ$

Find the size of angle  $FGD$ .

Give a reason for each stage of your working.

Angles on a straight line add to  $180^\circ$

$$\text{Angle } FEG = 180 - 125 = 55^\circ$$

$EFG = 55^\circ$  Angles at the base of an isosceles triangle are equal

$FGD = 55^\circ$  Alternate angles are equal

.....55.....<sup>o</sup>

(Total for Question 10 is 3 marks)