

Name: _____

Maths Genie Stage 9

Test C

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.*

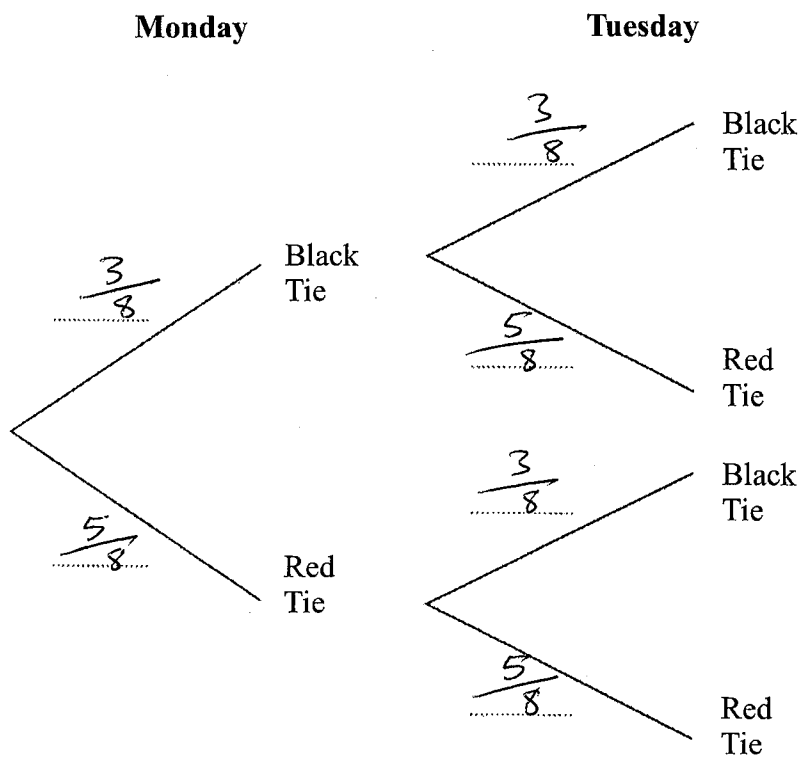
Advice

- 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 Each day Paul wears either a black tie or a red tie to work.

On any day the probability he wears a black tie is $\frac{3}{8}$

(a) Complete the probability tree diagram for Monday and Tuesday.



(b) Work out the probability Paul wears different coloured ties on Monday and Tuesday .

B R $\frac{3}{8} \times \frac{5}{8} = \frac{15}{64}$

R B $\frac{5}{8} \times \frac{3}{8} = \frac{15}{64}$

$$\frac{15}{64} + \frac{15}{64} = \frac{30}{64}$$

$$\frac{30}{64}$$

(2)

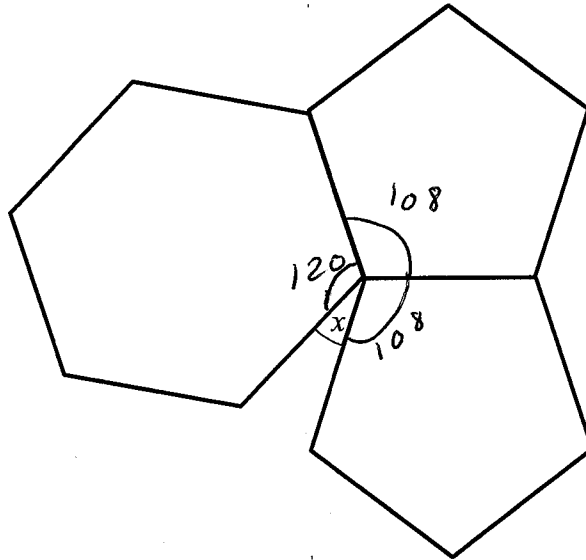
(Total for Question 1 is 4 marks)

- 2 A line passes through the point (0, -7).
The gradient of this line is 2.
Write down the equation of this line.

$$y = 2x - 7$$

(Total for Question 2 is 2 marks)

3



The diagram shows two regular pentagons and a regular hexagon meeting at a point.

Work out the size of the angle marked x .
You must show all your working.

$$\frac{360}{5} = 72 \quad 180 - 72 = 108^\circ$$

$$\frac{360}{6} = 60 \quad 180 - 60 = 120^\circ$$

$$\begin{array}{r} 120 \\ 108 \\ + 108 \\ \hline 336 \end{array}$$

$$360 - 336 = 24^\circ$$

..... 24

(Total for Question 3 is 3 marks)

4 Make b the subject of $a = \sqrt{\frac{b-7}{2}}$

$$a^2 = \frac{b-7}{2}$$

$$2a^2 = b-7$$

$$2a^2 + 7 = b$$

$$b = 2a^2 + 7$$

(Total for Question 4 is 3 marks)

5 A is the point $(7, -5)$ and B is the point $(4, -1)$.

(a) Write down as a column vector \overrightarrow{AB}

$$\begin{pmatrix} 4 - 7 \\ -1 - -5 \end{pmatrix}$$

$$\begin{pmatrix} -3 \\ 4 \end{pmatrix}$$

(1)

C is the point $(2, 5)$ and D is the point $(-1, 9)$.

(b) Write down as a column vector \overrightarrow{CD}

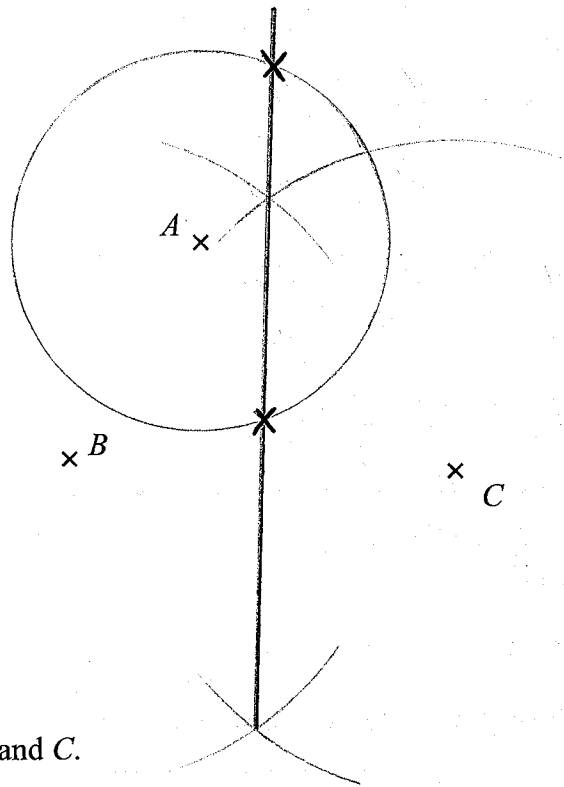
$$\begin{pmatrix} -1 - 2 \\ 9 - 5 \end{pmatrix}$$

$$\begin{pmatrix} -3 \\ 4 \end{pmatrix}$$

(1)

(Total for Question 5 is 2 marks)

- 6 A , B and C are three points on a map.
1 cm represents 100 metres.

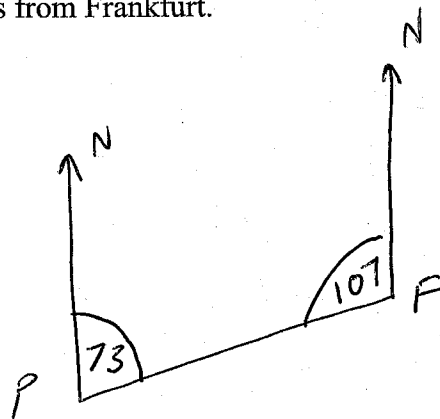


Point P is 250 metres from A .
Point P is equidistant from B and C .

On the map, show the possible positions of P .

(Total for Question 6 is 3 marks)

- 7 The bearing of Frankfurt from Paris is 073° .
Find the bearing of Paris from Frankfurt.



$$360 - 107 = 253^\circ$$

253 °

(Total for Question 7 is 2 marks)

8 The line AB passes through the points $A(3, -2)$ and $(6, k)$.

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

The gradient of AB is 4.

Work out the value of k .

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

$$4 = \frac{k - (-2)}{6 - 3}$$

$$4 = \frac{k + 2}{3}$$

$$12 = k + 2$$

$$k = 10$$

$$k = \dots\dots\dots 10$$

(Total for Question 8 is 3 marks)

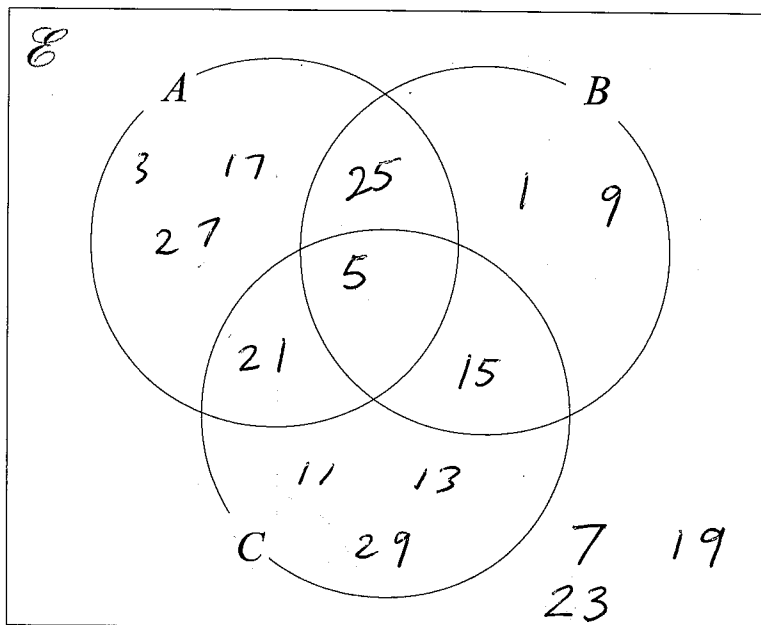
9 $\mathcal{E} = \{\text{odd numbers less than } 30\}$

$A = \{3, 5, 17, 21, 25, 27\}$

$B = \{1, 3, 9, 15, 23\}$

$C = \{3, 11, 13, 15, 21, 29\}$

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



A number is chosen at random from \mathcal{E} .

(b) Find the probability that the number is a member of $(A \cap B)$.

$$\frac{2}{15}$$

(Total for Question 9 is 3 marks)