Name: _____

Maths Genie Stage 14

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 be used.**

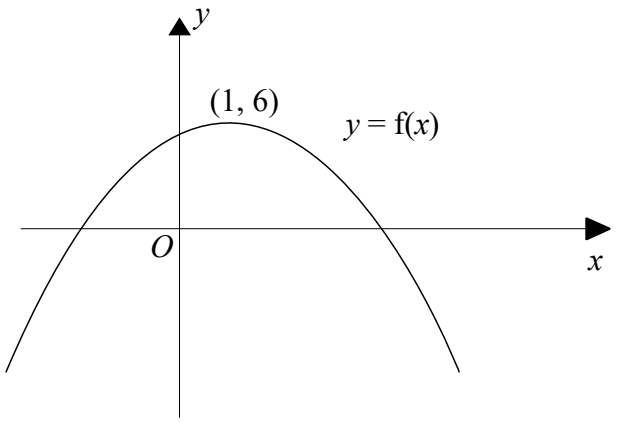
Information

- 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 The graph of $y = f(x)$ is shown below.



The coordinates of the maximum point of this curve are (1, 6).

Write down the coordinates of the maximum point of the curve with equation

(a) $y = f(x + 4)$

…….....

(1)

(b) $y = -f(x)$

…….....

(1)

(c) $y = f(x) + 2$

…….....

(1)

(Total for Question 1 is 3 marks)

2 Solve $x^2 - 2x + 24 \geq 0$

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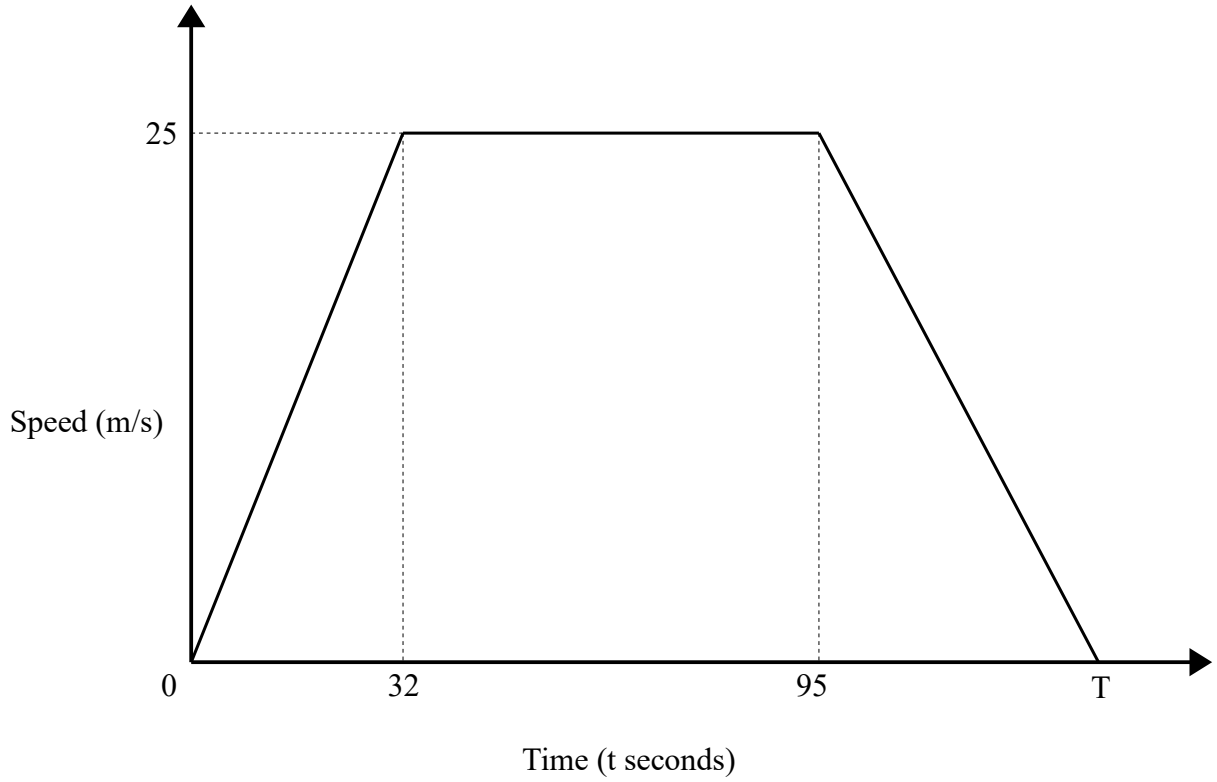
(Total for Question 2 is 3 marks)

3 Here is a speed-time graph for a train journey between 2 stations.



The train travelled 2.5 km in T seconds.

Work out the value of T.

…….....

(Total for Question 3 is 3 marks)

4 The point A has the coordinates (9,2)
The point B has the coordinates (3,4)

Find the equation of the perpendicular bisector to AB.

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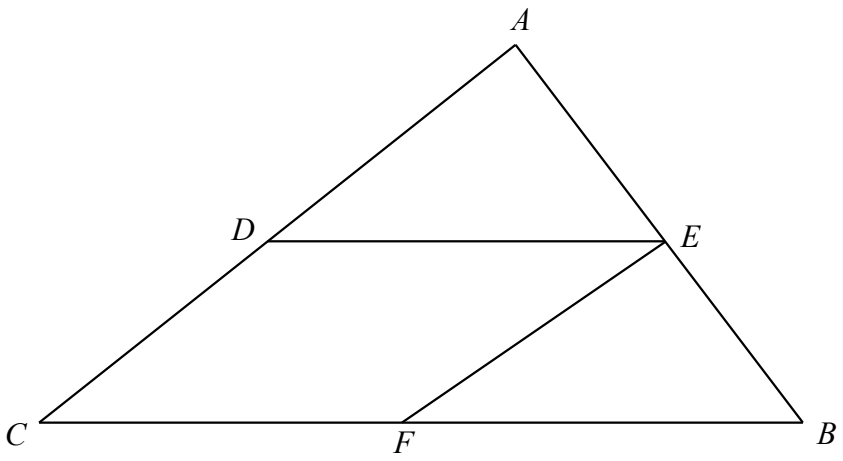
(Total for Question 4 is 4 marks)

5 *ABC* is a triangle.



CDEF is a parallelogram such that:
D is the midpoint of *AC*
E is the midpoint of *AB*
F is the midpoint of *BC*

Prove that triangle *ADE* is congruent to triangle *BEF*.

(Total for Question 5 is 4 marks)

6 Solve algebraically the simultaneous equations

$$x^2 - 2y^2 = 17$$
$$3x + 2y = 13$$

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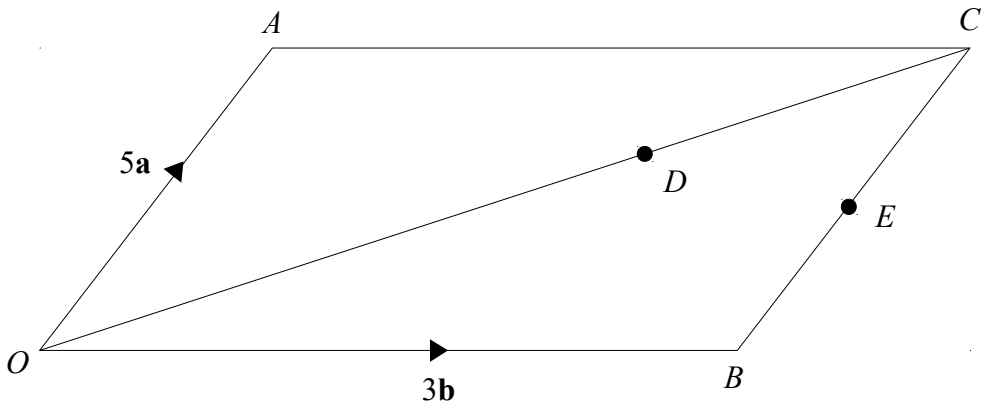
(Total for Question 6 is 5 marks)

7 The diagram shows a parallelogram.



$\overrightarrow{OA} = 5a$

$\overrightarrow{OB} = 3b$

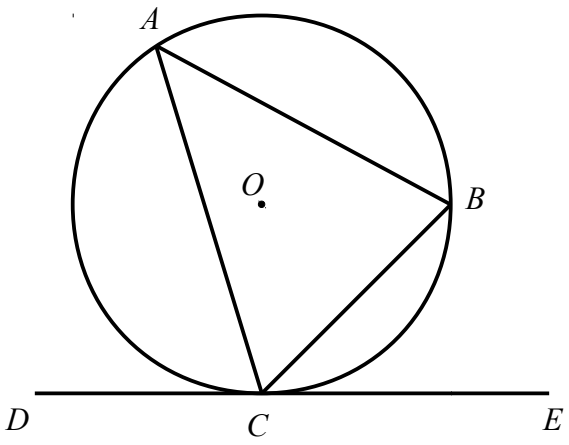
D is the point on OC such that OD:DC = 2:1

E is the midpoint of BC

Show that A, D and E are on the same straight line.

(Total for Question 7 is 4 marks)

8



A, *B* and *C* are points on the circumference of a circle, centre *O*.
DCE is a tangent to the circle.

Prove that angle *BCE* and angle *BAC* are equal.

(Total for Question 8 is 4 marks)

9 There are some red counters and some blue counters in a bag.

The ratio of red counters to blue counters is 3:1

Two counters are removed at random.

The probability that both the counters taken are blue is $\frac{2}{35}$

Work how many counters were in the bag before any counters were removed.

….....

(Total for Question 9 is 5 marks)