

Name: _____

Maths Genie Stage 14

Test D

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.**



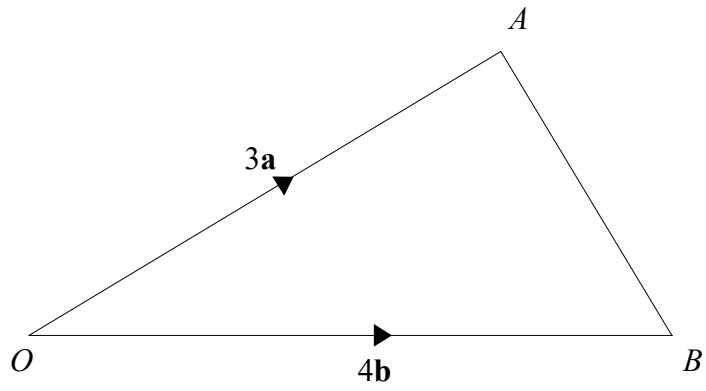
Information

- 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



$$\vec{OA} = 3a$$

$$\vec{OB} = 4b$$

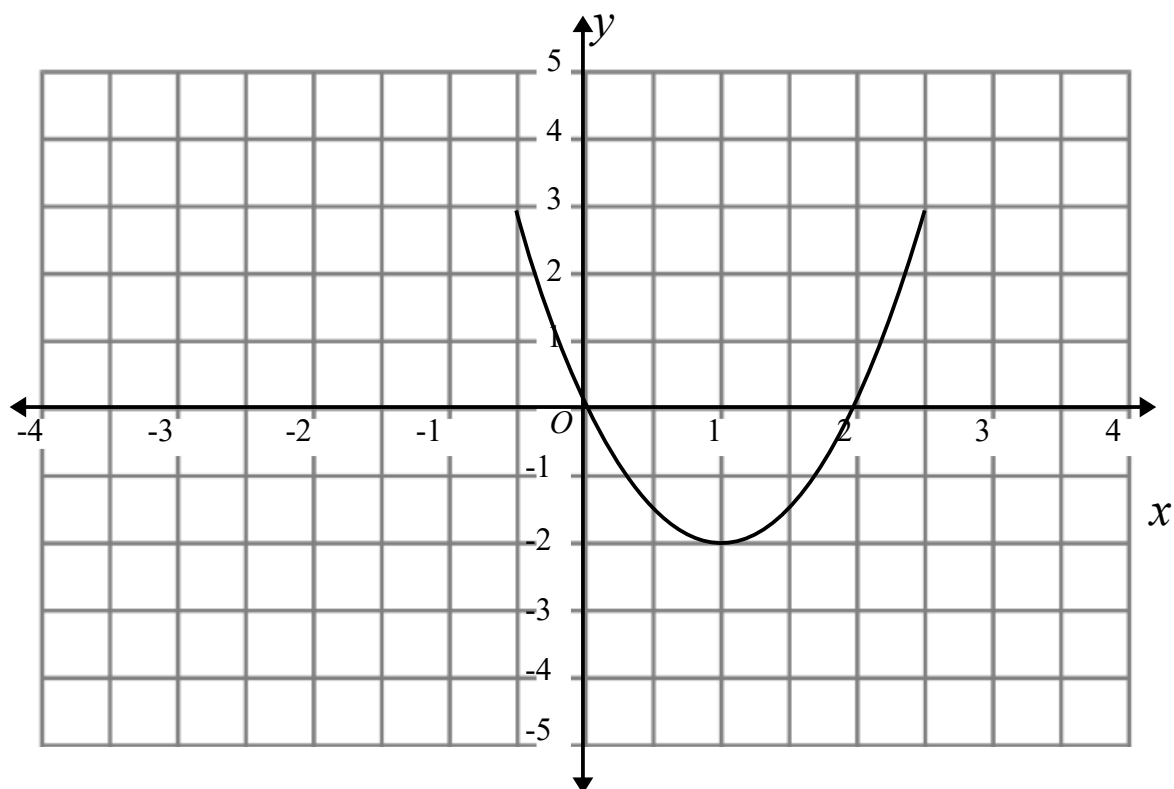
P is the point on AB such that AP:PB = 1:4

$$\vec{OP} = k(3a + b)$$

Find the value of k

.....
(Total for Question 1 is 3 marks)

2 The graph of $y = f(x)$ is shown on the grid.



(a) On the grid above, sketch the graph of $y = f(x) - 2$

(1)

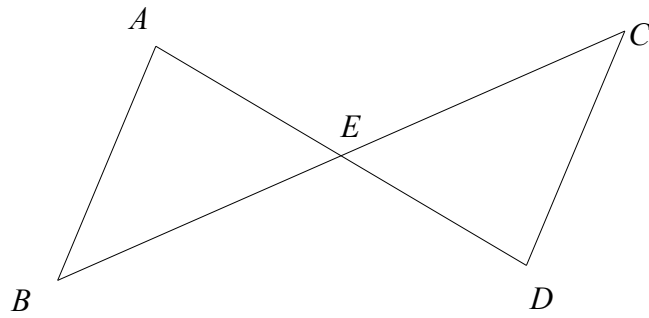
The graph of $y = f(x)$ has a turning point at $(1, -2)$.

(b) Write down the coordinates of the turning point of $y = -f(x + 3)$

.....
(1)

(Total for Question 2 is 2 marks)

3



AB and CD are parallel and equal in length.

Prove that triangle ABE and triangle CDE are congruent.

(Total for Question 3 is 3 marks)

4 Work out the integer values that satisfy: $2x^2 - 10x + 3 < 0$

(Total for Question 4 is 4 marks)

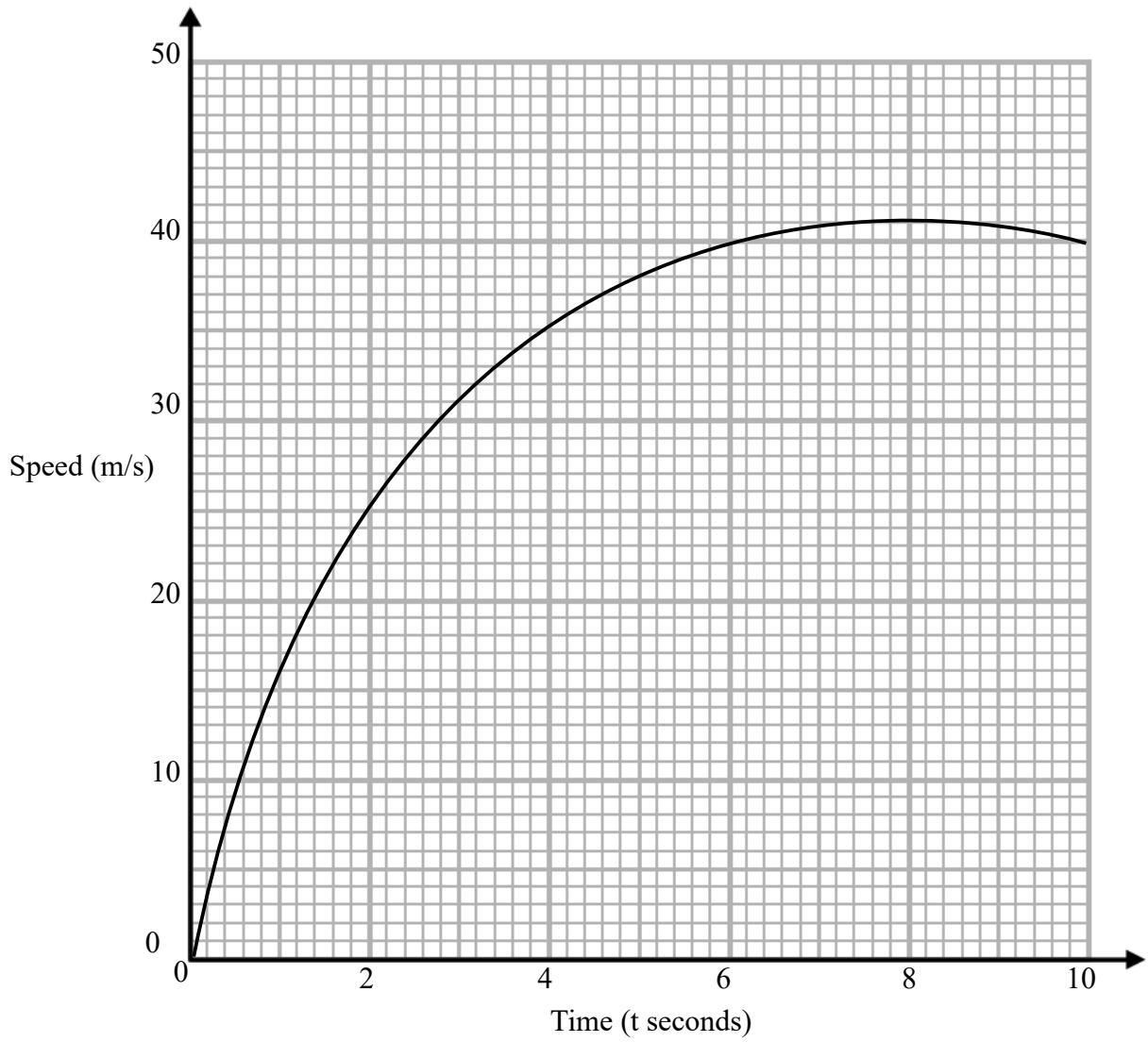
5 Solve the simultaneous equations

$$x^2 + y^2 = 29$$

$$y = 2x - 1$$

(Total for Question 5 is 5 marks)

6 Here is a speed-time graph.

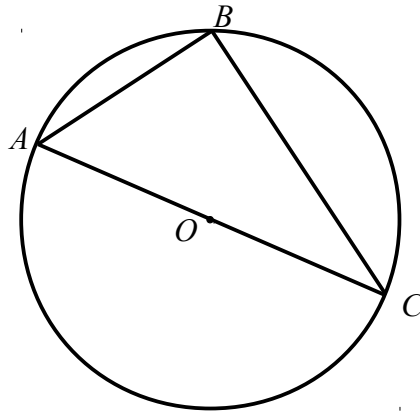


Use 5 strips of equal width to find an estimate for the distance travelled in 10 seconds.

..... m

(Total for Question 6 is 3 marks)

7



A , B and C are points on the circumference of a circle, centre O .
 AOC is a diameter of the circle.

Prove that angle ABC is 90°
You must **not** use any circle theorems in your proof.

(Total for Question 7 is 4 marks)

8 A circle has the equation $x^2 + y^2 = 17$

(a) Write down the coordinates of the centre of the circle.

P is the point $(1, -4)$ on the circle $x^2 + y^2 = 17$

.....
(1)

(b) Work out the equation of the tangent to the circle at P .

.....
(4)

(Total for Question 8 is 5 marks)

9 There are n counters in a bag.

5 of the counters are red and the rest are blue.

Ross takes a counter from the bag at random and does not replace it.
He then takes another counter at random from the bag.

The probability that Ross takes two blue counters is $\frac{3}{7}$

Find the value of n .

.....
(Total for Question 9 is 6 marks)
