Weekly check: Grade 9

Grade 9 | Higher | 20 questions, 54 marks

GCSE Maths weekly check

Scan for the solutions

Name: _____ **Date:** _____ **Score:** _____ **/ 54**

1 Prove that $x^2 - 6x + 11$ is greater than 0 for all values of x.

(3 marks)

Answer _____

2 A bag contains n counters. 3 of the counters are red.

A counter is taken at random, replaced, and then a second counter is taken at random.

Write down an expression, in terms of n, for the probability that both counters are red.

(2 marks)

Answer _____

3 A regular hexagon is drawn inside a circle of radius r so that all six vertices lie on the circle.
Each side of the hexagon is equal to r.

The perimeter of the hexagon is less than the circumference of the circle.

Use this to show that $\pi > 3$.

(3 marks)

Answer _____

4 $y = -x^2 + 6x - 4$

By completing the square, find the coordinates of the turning point. State whether it is a maximum or a minimum.

(3 marks)

Answer _____

5 By completing the square, find the coordinates of the minimum point of the curve

$y = x^2 + 10x - 2$

(3 marks)

Answer _____

6 a. Write $x^2 - 6x + 11$ in the form $(x - a)^2 + b$, where a and b are integers.

b. Hence find the coordinates of the turning point of the curve $y = x^2 - 6x + 11$

(3 marks)

Answer _____

7 $f(x) = 2x + 1$ and $g(x) = x - 4$

Find $(fg)^{-1}(x)$.

(3 marks)

Answer _____

8 Work out the exact value of sin 60° × cos 30°.

Give your answer as a fraction.

(2 marks)

Answer _____

9 A bag contains $2x$ green counters and $(x + 4)$ yellow counters. A counter is taken at random.

The probability that it is green is $\frac{2}{5}$.

Work out the value of x.

(3 marks)

Answer _____

10 A biased coin is flipped twice. The flips are independent.
The probability of getting heads on both flips is 0.64.
Work out the probability of getting heads on one flip of the coin.

(2 marks)

Answer _____

11 A box contains n counters. 5 of the counters are green.
A counter is taken at random and **not** replaced. A second counter is then taken at random.
Write down an expression, in terms of n, for the probability that both counters are green.

(2 marks)

Answer _____

12 Work out the exact value of $(\sin 30° + \cos 60°) \times \tan 60°$.

(2 marks)

Answer _____

13 Two shapes are mathematically similar. The smaller has area 12 cm^2 and the larger has area 27 cm^2. A side of the smaller shape is 4 cm long.
Work out the length of the matching side of the larger shape.

(2 marks)

Answer _____

14 Prove algebraically that the difference between the squares of two consecutive integers is equal to the sum of the two integers.

(3 marks)

Answer _____

15 Prove algebraically that the sum of the squares of any three consecutive integers is always 2 more than a multiple of 3.

(3 marks)

Answer _____

16 $y = 3x^2 - 12x + 5$

Write y in the form $a(x + b)^2 + c$ and write down the coordinates of the turning point. (3 marks)

Answer _____

17 AB is a diameter of a circle with centre O.

C is a point on the circle, not at A or B.

Prove that angle ACB = 90°.

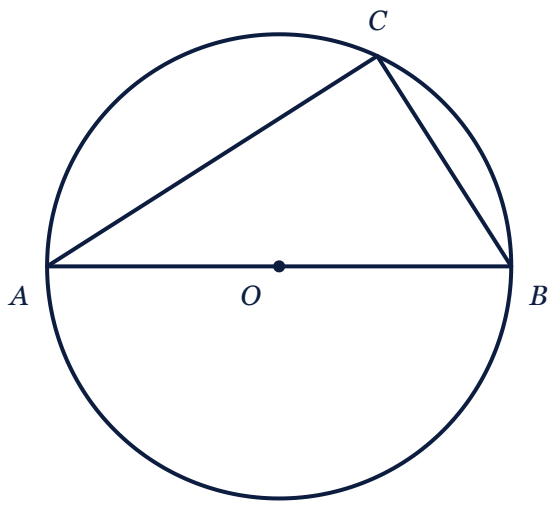


Diagram NOT accurately drawn

(3 marks)

Answer _____

18 $y = x^2 + 6x + 4$

By completing the square, find the coordinates of the turning point and say whether it is a maximum or a minimum. (3 marks)

Answer _____

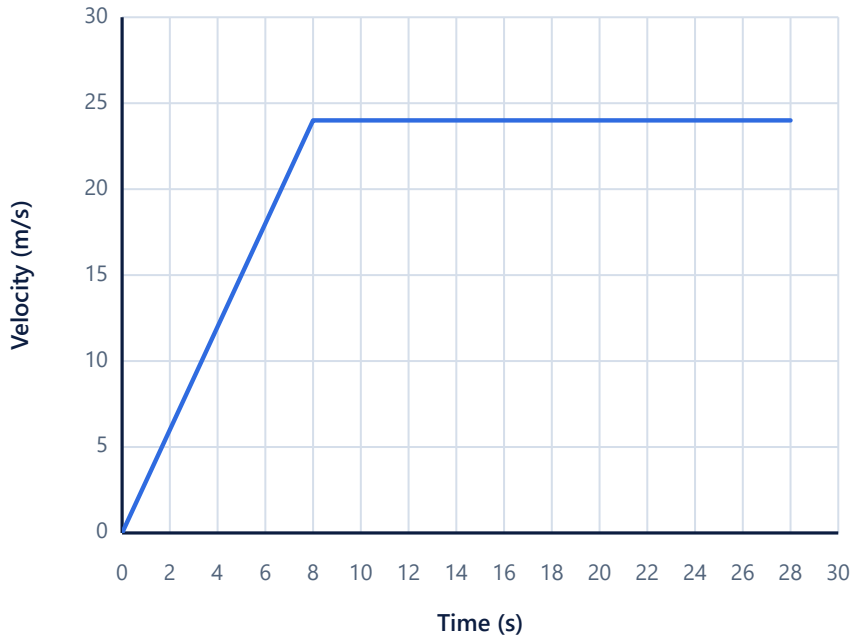
19 Prove algebraically that $(3n + 1)^2 - (3n - 1)^2$ is a multiple of 12 for every integer n. (3 marks)

Answer

20 A car starts from rest and accelerates uniformly to a velocity of 24 m/s in 8 seconds.
It then travels at a constant velocity of 24 m/s for a further 20 seconds.

a. Work out the acceleration of the car during the first 8 seconds.

b. Work out the total distance travelled by the car in the 28 seconds.



(3 marks)

Answer

End of questions | Total 54 marks