

Maths Advent Calendar

1

Simplify
 $x^2(5x^{-0.5})^3$

$$125x^{1/2}$$

2

For a function
 $f(x)$ what does
 $f(-x)$ do to the
 graph?

Reflect in y axis

3

Solve
 $4 - 5x^2 - 2x$
 $= 0$

$$x = \frac{-1 \pm \sqrt{21}}{5}$$

4

Differentiate

$$y = 2x^4 - 5x^2 + 3$$

$$\frac{dy}{dx} = 8x^3 - 10x$$

5

Find the values of
 x such that
 $5(2x + 4)$
 $> x - 7$

$$x > -3$$

6

Find the centre of
 the circle
 $x^2 + y^2 - 6x$
 $+ 4y = -4$

$$(3, -2)$$

7

Find the gradient
 of
 $15x + 3y = 7$

$$\text{Grad} = -5$$

8

Write $x^2 + 6x - 1$
 in completed
 square form.

$$(x+3)^2 + 8$$

9

Without using a
 calculator, what is
 $\sin 45^\circ$

$$\frac{\sqrt{2}}{2}$$

10

Given that $5^x = 125$, find x

$$x = 3$$

11

Integrate

$$x^3 - 2x + 5$$

$$\frac{x^4}{4} - x^2 + 5x + C$$

12

For a function
 $f(x)$ what does
 $3f(4x)$ do to the
 graph?

y stretch 3

x stretch $\frac{1}{4}$

13

How do you find
 the gradient of a
 normal?

Negative
 Reciprocal

14

Find the values of
 x such that
 $3x - 6 \leq 6x - 3$

$$x \geq -1$$

15

Solve

$$t^2 + 6t + 1 = 4$$

$$t = -3 + 2\sqrt{3}$$

or

$$t = -3 - 2\sqrt{3}$$

16

Find

$$\int_{-1}^5 -x^2 + 4x + 5$$

$$36$$

17

Solve

$$2x(x + 3) + 2 = -2x$$

$$x = -2 + \sqrt{3}$$

$$x = -2 - \sqrt{3}$$

18

Find the gradient
 of
 $y = x^4 + 7x^2$ at
 $x = 1$

$$18$$

19

Find the first 4
 terms of $(3 + x)^8$

$$6561 + 17496x$$

$$+ 20412x^2$$

$$+ 13608x^3$$

20

Solve the
 equation

$$3^{0.5x-1} = \frac{\sqrt{3}}{81}$$

21

Find the minimum
 point of
 $2x^2 + 7x - 3$

$$\left(-\frac{7}{4}, -\frac{73}{8}\right)$$

22

For a function
 $f(x)$ what does
 $f(x + 3) + 1$ do
 to the graph?

Translation $\left(\begin{smallmatrix} -3 \\ 1 \end{smallmatrix}\right)$

23

Differentiate

$$\frac{3x^5 + 1}{\sqrt{x}}$$

$$\frac{1}{2}(27x^{3/2} - x^{-3/2})$$

24

Find the values of
 x such that
 $6x^2 + 11x - 2$
 < 0

$$-2 < x < \frac{1}{6}$$

Merry Christmaths!