

Algebra 5H Assessment

Higher Level



All questions

| Clip | Grade | Title of clip | Question(s) | Marked out of | Score | % |
|----------|--------|-----------------------------------|-------------|---------------|-------|-----|
| 193..... | 7..... | Algebraic Proof | 1 | 7 | ___ | ___ |
| 194..... | 7..... | Exponential Functions | 2 - 3 | 7 | ___ | ___ |
| 195..... | 7..... | Trigonometric Graphs | 4 - 6 | 10 | ___ | ___ |
| 196..... | 7..... | Transformation of Functions | 7 - 8 | 8 | ___ | ___ |
| 197..... | 7..... | Equation of a Circle | 9 - 10 | 10 | ___ | ___ |
| 198..... | 7..... | Regions | 11 - 12 | 8 | ___ | ___ |

Out of 50 TOTAL SCORE _____

Final Percentage %

- 1) a) Prove algebraically that the difference between the squares of any two consecutive numbers is always an odd number.

3

- b) Prove that $(5n + 1)^2 - (5n - 1)^2$ is a multiple of 5 for all positive integer values of n

4

- 2) The graph shows the sketch of $y = ab^x$
The curve passes through the points (0, 0.25) and (2, 4).

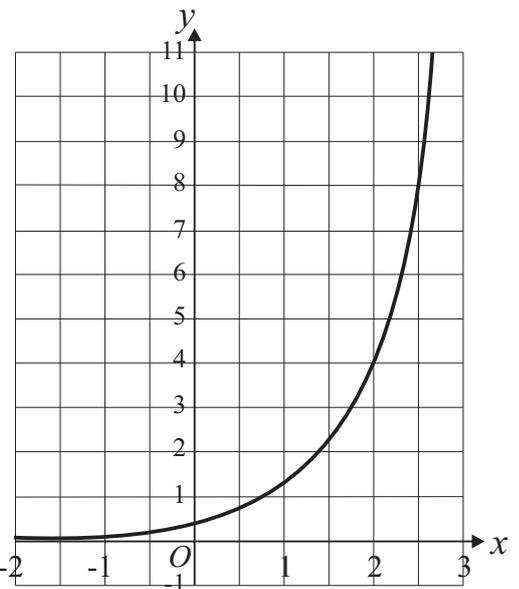
- a) Find the value of a and the value of b .

$$a = \underline{\hspace{2cm}} \quad b = \underline{\hspace{2cm}} \quad 3$$

- b) The point C(-0.5, k) lies on the curve.

Find the value of k .

$$k = \underline{\hspace{2cm}} \quad 2$$

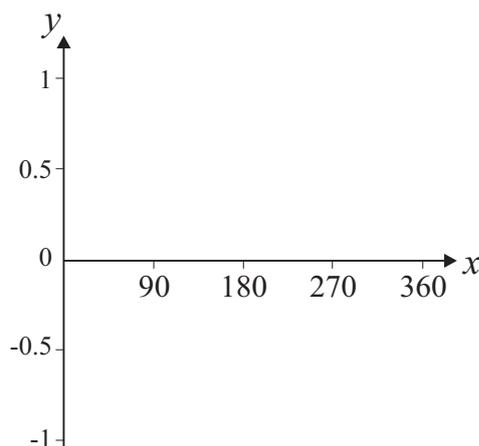


- 3) The price of a house on Percy Street increases exponentially.
Its price increases by 2.5% every year.
When the house is 5 years old it is worth £275 000.

What was the original price of the house (to the nearest £1 000) when new?

$$\pounds \underline{\hspace{2cm}} \quad 2$$

- 4) a) Sketch the graph of $y = \cos x$
in the interval $0^\circ \leq x \leq 360^\circ$



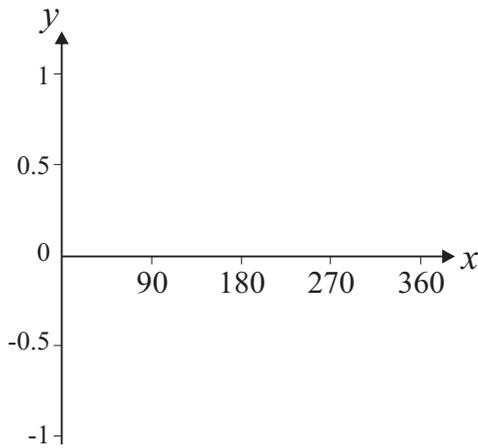
2

- b) In the interval $0^\circ \leq x \leq 360^\circ$, find the values of x for which $\cos x = 0.2588$
Give your answers to the nearest degree.

$$x = \underline{\hspace{1cm}}^\circ, \underline{\hspace{1cm}}^\circ$$

2

- 5) a) Sketch the graph of $y = \sin x$ in the interval $0^\circ \leq x \leq 360^\circ$



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- b) In the interval $0^\circ \leq x \leq 360^\circ$, find the values of x for which $\sin x = -0.1769$
Give your answers to the nearest degree.

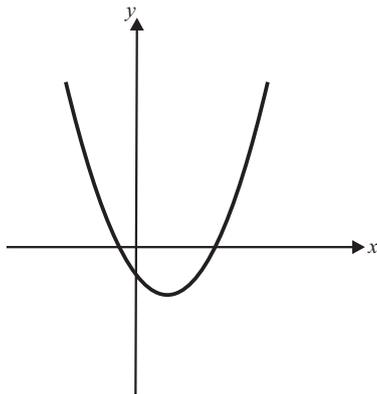
$x = \underline{\hspace{1cm}}^\circ, \underline{\hspace{1cm}}^\circ$

2

- 6) In the interval $0^\circ \leq x \leq 360^\circ$, find the values of x for which $\tan x = 1.926$
Give your answers to the nearest degree.

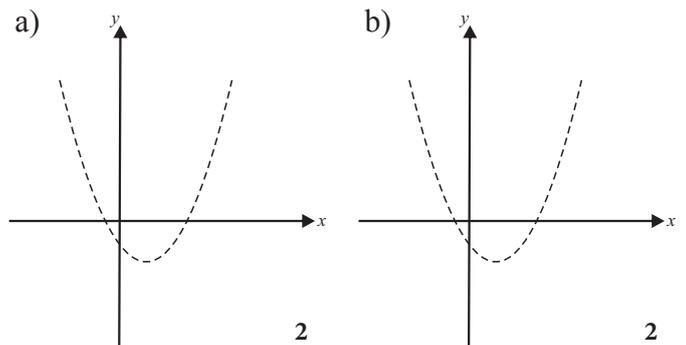
$x = \underline{\hspace{1cm}}^\circ, \underline{\hspace{1cm}}^\circ$ 2

- 7) The diagram shows the graph of $y = f(x)$



On the axes below, sketch the graph of each of these functions (the graph of $y = f(x)$ is shown dotted to help you).

- a) $y = f(x) - 2$
b) $y = f(x - 2)$

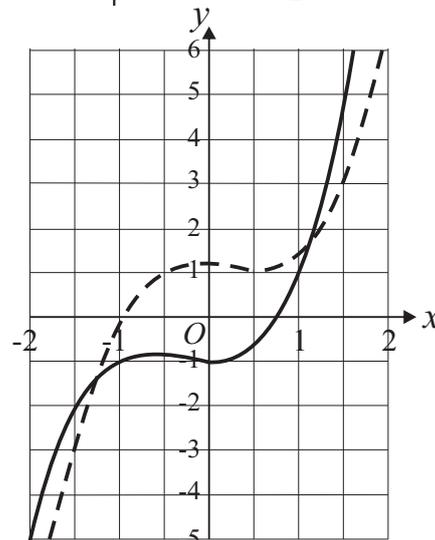


- 8) The solid curve has equation $y = x^3 + x^2 - 1$
a) Write down an equation of the dotted curve.

$y = \underline{\hspace{10cm}}$ 2

- b) Describe the transformation that maps the solid curve onto the dotted one.

2



9) a) A circle has its centre at the origin and a radius of 5.

What is its equation? _____ 2

b) A circle has equation $x^2 + y^2 = 64$

What is the length of the radius? $r =$ _____ 2

10) a) Draw the graph of $x^2 + y^2 = 16$ 2

b) Using your graph, estimate the solutions of the equations

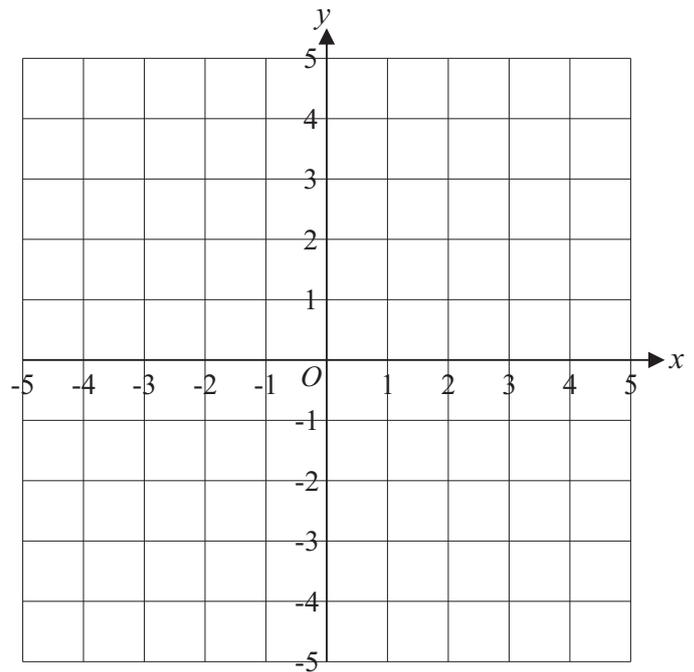
$$x^2 + y^2 = 16$$

$$y = x + 1$$

Give your answers to 1 decimal place.

| | |
|-------------|-------------|
| $x =$ _____ | $x =$ _____ |
| $y =$ _____ | $y =$ _____ |

4



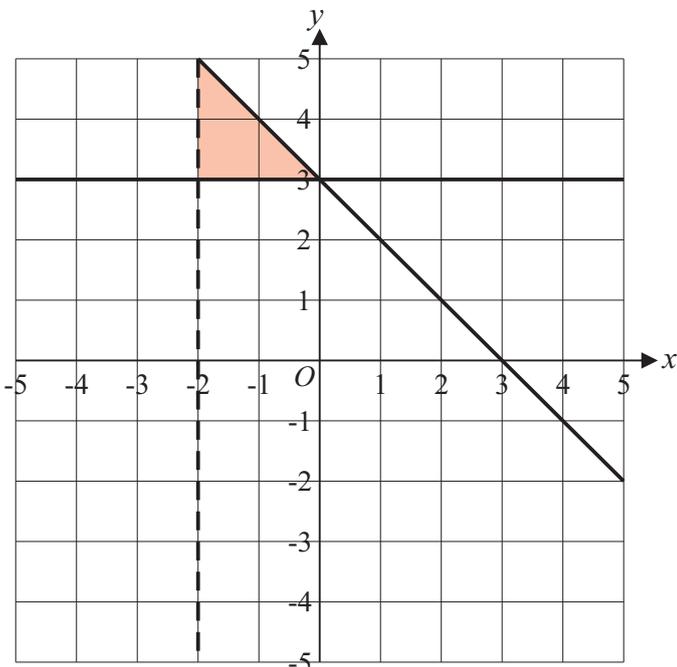
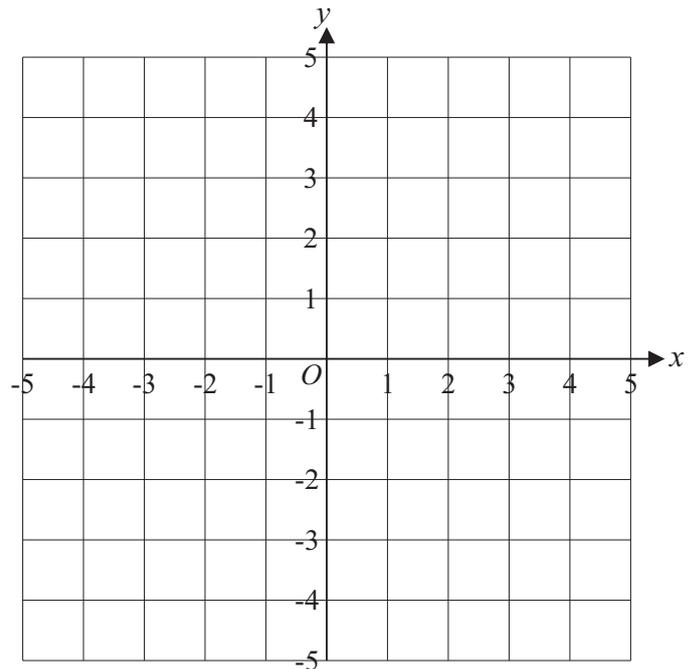
11) Put a label, R , in the region on the grid on the right satisfied by all three inequalities below.

$$x \leq 4$$

$$y \geq x$$

$$y \leq 2x - 3$$

4



12) Use inequalities to describe the shaded area on the grid on the left.