Algebra – 2022 GCSE Mathematics Higher

1. June/2022/Paper_J560/04/No.14

   $(x+2)(3x+a)(bx+3) = 6x^3 + 11x^2 - 17x - 30$

   Find the value of *a* and the value of *b*.

   a = ...

   b = ... **[2]**

2. June/2022/Paper_J560/04/No.15

   Use algebra to prove that an odd number multiplied by a different odd number always gives an answer that is an odd number. **[4]**

3. June/2022/Paper_J560/04/No.19

(a) Write as a single fraction in its simplest form.

$$\frac{4}{2n+3} - \frac{2n}{n^2+1}$$

(a) .... **[4]**

3. June/2022/Paper_J560/04/No.19

$$\frac{4}{2n+3} - \frac{2n}{n^2+1}$$

2

(b) Simplify.

$$\frac{x^2 - x - 12}{2x^2 - 3x - 20}$$

(b) .... **[5]**

4. June/2022/Paper_J560/04/No.20

Solve this inequality.

$$x^2 + 4x - 12 \leqslant 0$$

Give your answer using set notation.
You must show your working.

.... **[5]**

5. June/2022/Paper_J560/05/No.7

(a) A car accelerates at $4.06\,\text{m/s}^2$ for 10.1 seconds from an initial velocity of $2.93\,\text{m/s}$.

Harper rounds each value to 1 significant figure.
Harper uses the rounded values and the formula

$$s = ut + \frac{1}{2}at^2$$

to estimate the distance travelled in the 10.1 seconds.
Harper's answer is 430 metres.

Using Harper's method, show that their answer is wrong. **[4]**

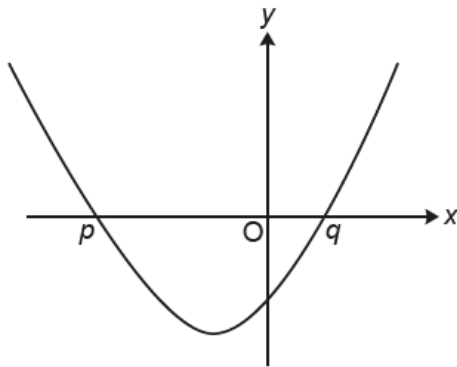**(b)** Rearrange this formula to make t the subject.

$$s = \frac{1}{2}at^2$$

(b) .... **[3]**

6. June/2022/Paper_J560/05/No.13

The graph of $y = x^2 + 6x - 2$ is shown below.
The roots of the equation $x^2 + 6x - 2 = 0$ are at p and q.

(a) (i) Calculate y when $x = 1$.

(a)(i) $y =$ .... [1]

(ii) Without solving the equation, explain why q must lie between 0 and 1.

....

.... [2]

(iii) Explain why using a method of iteration is not the most appropriate way of finding a solution to this equation.

....

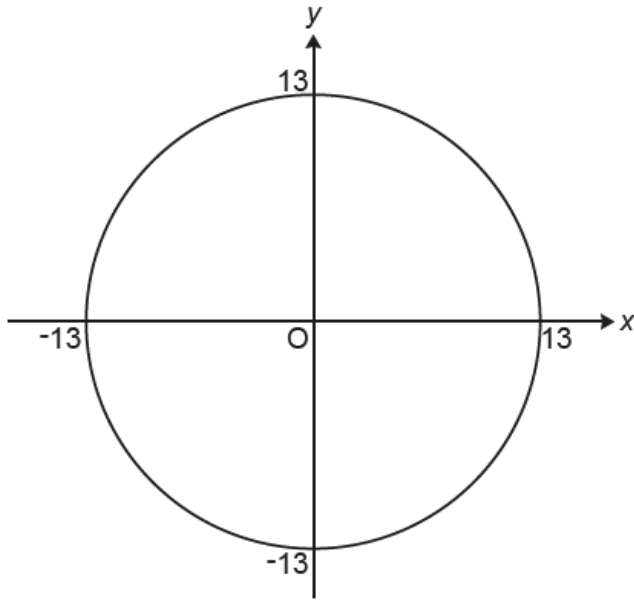.. [1]

(b) The exact value of q is $\dfrac{-6 + \sqrt{44}}{2}$.

Write $\dfrac{-6 + \sqrt{44}}{2}$ in the form $a + \sqrt{b}$.

(b) .... [3]

7. June/2022/Paper_J560/05/No.19

The graph below shows a circle with centre (0, 0) and equation $x^2 + y^2 = 169$.

(a) Show that the point (-12, 5) lies on the circumference of the circle. **[2]**

(b) Find the equation of the tangent to the circle at the point (⁻12, 5), giving your answer in the form $y = mx + c$.

(b) .... **[5]**

8. June/2022/Paper_J560/06/No.7

(a) Multiply out and simplify.

$(x-4)(x+5)$

(a) .... **[2]**

(b) Factorise.

$x^2 - 25$

(b) .... **[1]**

June/2022/Paper_J560/06/No.7

9. June/2022/Paper_J560/06/No.19

(a) Write $x^2 - 8x + 9$ in the form $(x - a)^2 - b$.

(a) .... [3]

(b) Use your answer from part **(a)** to solve.

$x^2 - 8x + 9 = 0$

Give your answers in exact form.
You must show your working.

(b) $x =$ .... or $x =$ .... [2]