

Enrolment summer work 2023

Question 1

Skill involved: K184b: Solve an equation with one fraction equals to a linear expression.

Solve

$$\frac{1}{f+2} = 3$$

(2 marks)

Question 2

Skill involved: K295a: Solve an equation with fractions leading to a quadratic equation.

Solve

$$\frac{5}{(x+2)} + \frac{9}{(x-2)} = 2$$

(5 marks)

Question 3

Skill involved: K294d: Subtract algebraic fractions with algebraic linear denominators.

Simplify

$$\frac{2}{2x-1} - \frac{1}{x+1}$$

(4 marks)

Question 4

Skill involved: K186f: Change the subject of a formula with fractions.

$$u = \frac{3t}{4} + 2$$

Make t the subject of the formula.

(3 marks)

Question 5

Skill involved: K186b: Change the subject of a linear formula requiring two steps.

Make s the subject of $v^2 = u^2 + 2as$

(2 marks)

Question 6

Skill involved: K262b: Change the subject of a formula where the subject appears on both sides.

Make t the subject of the formula

$$2(d - t) = 4t + 7$$

(3 marks)

Question 7

Skill involved: K262c: Change the subject of a formula where the subject appears twice on a fraction.

Make e the subject of the formula

$$T = \frac{n(1+e)}{(1-e)}$$

(5 marks)

Question 8

Skill involved: K313a: Simplify a surd.

Write $\sqrt{45}$ in the form $k\sqrt{5}$, where k is an integer.

(1 mark)

Question 9

Skill involved: K315a: Add or subtract surds with the same number under the square root.

Write $\sqrt{45} + \sqrt{20}$ in the form $k\sqrt{5}$

(2 marks)

Question 10

Skill involved: K314c: Divide two surds.

Select the value that is equivalent to $4\sqrt{75} \div 2\sqrt{3}$

(1 mark)

Question 11

Skill involved: K314g: Expand two brackets with surds, where subsequent simplification of surds required.

Simplify fully $(4 + \sqrt{12})(5 - \sqrt{3})$

(3 marks)

Question 12

Skill involved: E314: Multiply and divide surds.

Choose the value that is equivalent to $(5\sqrt{3})^2$

Question 13

Skill involved: K314g: Expand two brackets with surds, where subsequent simplification of surds required.

Expand $(1 + \sqrt{2})(3 - \sqrt{2})$

Give your answer in the form $a + b\sqrt{2}$ where a and b are integers.

(2 marks)

Question 14

Skill involved: K316a: Rationalise the denominator of a fraction where the denominator is a single surd.

Rationalise the denominator of $\frac{10}{\sqrt{5}}$

Give your answer in its simplest form.

(2 marks)

Question 15

Skill involved: E16: Understand power notation and calculate simple powers, e.g. squares, cubes.

Work out the value of $5^2 + 2^3$.

(2 marks)

Question 16

Skill involved: E17: Calculate the nth root of a number.

Simplify:

$$\sqrt{196} - 2^3$$

Question 17

Skill involved: E207: Deal with negative indices.

What is the reciprocal of $\frac{4}{5}$?

Question 18

Skill involved: K207a: Raise a number to a negative power.

Find the value of 4^{-2}

(1 mark)

Question 19

Skill involved: E16: Understand power notation and calculate simple powers, e.g. squares, cubes.

Work out the value of

$$(\sqrt{3})^2$$

(1 mark)

Question 20

Skill involved: E208: Be able to express a power using a different base, e.g. $4^6 = 2^{12}$.

Write 81^k as a power of 3

Question 21

Skill involved: K206a: Laws of indices for multiplying powers.

Simplify $k^6 \times k^3$

(1 mark)

Question 22

Skill involved: K206b: Laws of indices for dividing powers.

Simplify $y^9 \div y^3$

(1 mark)

Question 23

Skill involved: K206b: Laws of indices for dividing powers.

Write

$$\frac{7^5 \times 7^9}{7^6}$$

as a single power of 7.

(2 marks)

Question 24

Skill involved: E206: Use laws of indices for multiplying powers, dividing powers and raising a power to a power. Deal with a power of 0.

Simplify

$$\frac{10x^7y^8}{2x^4y^3}$$

Question 25

Skill involved: K206f: Raise an algebraic term to a positive integer power.

Simplify $\left(4h^{\frac{2}{3}}\right)^3$

(2 marks)

Question 26

Skill involved: K206f: Raise an algebraic term to a positive integer power.

Remove the brackets and simplify $\left(\frac{2}{3}p^4\right)^2$.

(2 marks)

Question 27

Skill involved: E318: Deal with fractional indices.

Write down the value of $8^{\frac{1}{3}}$.

(1 mark)

Question 28

Skill involved: E318: Deal with fractional indices.

Find the value of $8^{-\frac{2}{3}}$

(2 marks)

Question 29

Skill involved: K178b: Factorise by taking an algebraic factor out with single variable.

Factorise

$$x^2 - 3x$$

(2 marks)

Question 30

Skill involved: E196: Factorise more difficult non-quadratic expressions, e.g. combining factorisation techniques or requiring factorisation of a bracketed term.

Factorise fully $2z - 8z^3$

Question 31

Skill involved: E193: Factorise quadratics of the form $x^2 + bx + c$.

The expression

$$x^2 + 8x + 12$$

can be factorised in the form $(x + a)(x + b)$.

To find a and b you need to find two numbers that...

- multiply to give 12
and add to give 8
- multiply to give 8
and add to give 12

Question 32

Skill involved: E194: Factorise the difference of two squares.

Factorise $x^2 - 100$

Question 33

Skill involved: E193: Factorise quadratics of the form $x^2 + bx + c$.

Factorise $x^2 + x - 12$

Question 34

Skill involved: E193: Factorise quadratics of the form $x^2 + bx + c$.

Factorise fully:

$3x^2 - 12x - 15$

Question 35

Skill involved: E193: Factorise quadratics of the form $x^2 + bx + c$.

Factorise fully:

$2x^2 - 6x - 56$

Question 36

Skill involved: K201e: Simplify algebraic fractions where factorisation of both the numerator and denominator is required.

Simplify fully

$\frac{c^2+5c+4}{3c+3}$

(3 marks)

Question 37

Skill involved: E202: Multiply and divide algebraic fractions.

Simplify

$$\frac{x^2+4x-12}{x^2-25} \div \frac{x+6}{x^2-5x}$$

(5 marks)

Question 38

Skill involved: K265b: Solve quadratics in the form $x^2 + bx + c = 0$, solvable by factorisation.

Solve

$$x^2 - 11x + 24 = 0$$

(2 marks)

Question 39

Skill involved: K265d: Solve quadratics of the form $ax^2 + bx + c = 0$, requiring factorising.

Solve the equation

$$2x^2 + 7x - 15 = 0$$

(3 marks)

Question 40

Skill involved: E265: Solve quadratic equations by factorisation.

Solve the equation

$$2x^2 - x - 3 = 0$$

Question 41

Skill involved: K182a: Solve a linear equation with the unknown on both sides.

Solve this equation.

$$75 + 2t = 100 - 2t$$

Question 42

Skill involved: E265: Solve quadratic equations by factorisation.

Solve the equation

$$\frac{18+x^2}{x^2} = 3$$

Question 43

Skill involved: E265: Solve quadratic equations by factorisation.

Solve:

$$\frac{1}{x} + \frac{9}{x+4} = 2$$

Question 44

Skill involved: E198: Solve linear simultaneous equations using elimination or substitution.

Use simultaneous equations to solve the following:

$$2x + 5y = 5$$

$$4x + 3y = 3$$

Question 45

Skill involved: K198e: Solve simultaneous equations with unequal coefficients where the second unknowns have different signs.

Solve, algebraically, the system of equations

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

$$6x - 2y = 5$$

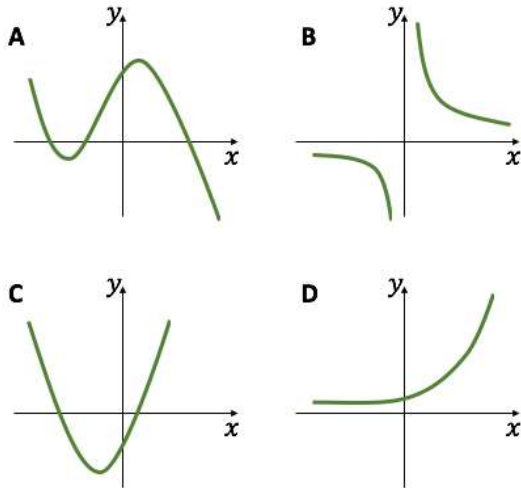
(3 marks)

Question 46

Skill involved: E203: Plot quadratic, cubic, exponential and reciprocal graphs.

Which of these is a cubic graph?

Which of these is a cubic graph?

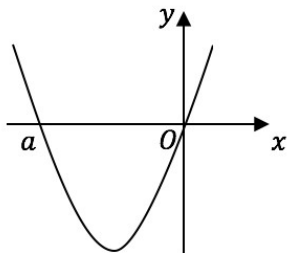


Question 47

Skill involved: E205: Sketch a quadratic graph by finding its intercepts with the axes.

Below is a sketch of the graph with equation $y = x(x + 10)$.

Work out the value of a .

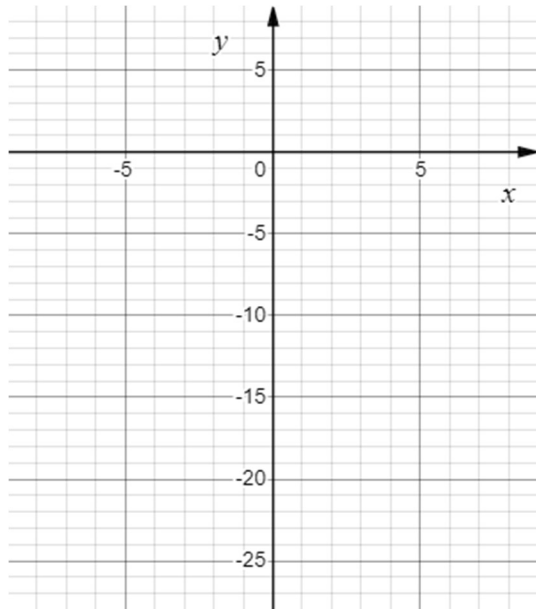


Question 48

Skill involved: K271g: Sketch a quadratic graph, including its intercepts and turning point.

Sketch the graph of $y = (x - 6)(x + 4)$.

On your sketch, show clearly the points of intersection with the x -axis and the y -axis, and the coordinates of the turning point.



(2 marks)
