MATHS SUMMER WORK 2025

Fractions 1

1. What is the value of $\frac{2006}{8}+\frac{6002}{8}$

2. There are 84 animals in a field
   11 are cows
   45 are sheep
   The rest are pigs

   What fraction of the animals are pigs? Give you answer in simplest form

3. Simplify fully $\frac{x}{6}+\frac{3x}{4}$

4. Calculate $\frac{5}{6}\times\frac{3}{5}$

   give your answer in simplest form

5. What is the value of

6. How many of these calculations equal 1
   Give reasons

   $\frac{1}{2}+\frac{1}{2}$ $\frac{1}{2}-\frac{1}{2}$ $\frac{1}{2}\times\frac{1}{2}$ $\frac{1}{2}\div\frac{1}{2}$

7. Sally has 30m of ribbon.
   She cuts lengths of $2\frac{3}{5}$ metres from the ribbon. Sally says she has enough ribbon to cut 12 lengths. Is she correct?
   You must show all workings

8. Express as a single fraction $\frac{2a}{3}-\frac{b}{4}$

Indices 2

Simplify the following

1. $t^5 \times t^4 =$

2. $\frac{8^7}{8^2} =$

3. $(3^4)^2 =$

4. $\frac{5^7\times5}{(5^3)^3} =$

5. $(8)^{\frac{1}{3}} =$

6. $y^0 =$

7. What is $4^{-3} =$

8. What is $\left(\frac{2}{3}\right)^{-2} =$

Surds 2

1. Simplify $\sqrt{d} + 6\sqrt{d} - 3\sqrt{d}$
2. Simplify $2\sqrt{b} \times 4\sqrt{3}$
3. Simplify fully $(4\sqrt{5})^2$
4. Write $\sqrt{75} + \sqrt{48} - 2\sqrt{12}$ in the form $k\sqrt{3}$
5. Simplify $\frac{\sqrt{125} - 2\sqrt{20}}{\sqrt{5}}$
6. Rationalise the denominator of $\frac{2\sqrt{2}}{\sqrt{5}}$
7. Evaluate $\frac{1}{\sqrt{2}} + \frac{\sqrt{3}}{\sqrt{6}}$
8. A triangle has base of $3\sqrt{2}$ and a perpendicular height of $5\sqrt{8}$

   Calculate the area of the triangle

Expanding 2

1. Expand y(2y – 3)
2. Expand $2x^2(3xy - 2x^3)$
3. Expand and simplify
   a. $5(x - 4) + 3(2x + 5)$
4. Expand and simplify
   a. $4(\sqrt{2} - 3) + 2(\sqrt{2} + 2)$
5. Multiply the expressions y and y + 4

   Which of these expressions show the result?

$5y$	$y(y + 4)$	$y^2 + 4y$	$4y + 4$

6. A rectangle of width 3cm and width x + 4 cm is made larger by doubling its side lengths. What is the area, in cm^2 of the larger rectangle?
7. Expand and simplify 4 – 3(2 – a + t) - t
8. Expand and simplify

   $\frac{a}{2}\left(3 + \frac{a}{4}\right) + \frac{a}{3}\left(2 + \frac{a}{2}\right)$

Expanding 2

1. Expand and simplify
   a. $(2x+3)(x-2)$

2. Expand and simplify
   i. $3x(x+3)+4(x+3)$

3. Expand and simplify
   i. $(x+6)^2+(x-3)^2$

4. Expand and simplify $(2-\sqrt{3})^2$

5. Simplify $\frac{2}{(x+3)}+\frac{x-3}{x}$

6. Expand and simplify $(x^3-7)(x^3+7)$

7. Expand and simplify
   1. $(3x+2)(4x^2+2x-3)$

8. Simplify $\frac{2x-2}{(x+2)}-\frac{x-2}{3x}$

Summary and review

1. Expand and simplify
   $\left(\frac{1}{3}x+\frac{1}{9}\right)\left(3x-\frac{2}{3}\right)$

2. Expand and simplify
   $(x+1)(x+2)(x+3)$

3. Expand and simplify
   $(x-3)(x+2)^2$

4. Expand and simplify
   $(2-\sqrt{3})(1+\sqrt{3})(1-\sqrt{3})$

5. Find the volume of a cube with side length
   $x-4$

6. Expand and simplify
   $(x^2-2)(x^2+2)(x+1)$

7. Write $\left(\sqrt{y}+\sqrt{8y}\right)^2$ in the form $a+b\sqrt{2}$.

   Given that $\left(\sqrt{y}+\sqrt{8y}\right)^2=54+b\sqrt{2}$.
   Find values for y and b.

8. Simplify $\frac{(x-1)(x+2)}{(x+3)}-\frac{4}{2x+1}$

Factorising 2

Fully factorise the following

1. $7x + 28$
2. $14 - 21x$
3. $y^2 - 8y$
4. $3t^4 + 9t^2$
5. $3x^3y - 12xy^2 + 6xy$
6. $8a^3b + 6y^2b - 10b$
7. $6x(x + 3) + 5(x + 3)$
8. $7y(3 - 2y) - 2(3 - 2y)$

Further Factorising 2

Factorise the following fully:

1. $x^2 + 6x - 7$
2. $y^2 + y - 12$
3. $y^2 - 11y + 28$
4. $t^2 + 7t - 18$
5. $k^2 + 9k + 20$
6. $x^2 + x - 56$
7. $p^2 - 25p$
8. $x^2(3x - 4) + (4 - 3x)$

Try factorising these expressions using the difference of two squares

1. $x^2 - 6^2$
2. $y^2 - 144$
3. $x^2 - y^2$
4. $4t^2 - 81$
5. $x^2 - 5$

Completing the square 2

Write these expressions in the form $(x + a)^2 + b$

1. $x^2 + 10x$
2. $x^2 + 10x + 30$
3. $y^2 - 2y$
4. $y^2 - 2y + 3$
5. $x^2 - 8x + 25$
6. $k^2 + 14k - 1$
7. $y^2 + 5y + 6$
8. $t^2 + 6t + 9$

Rearranging 2

1. Make x the subject of $x - f = y + b$
2. Make y the subject $ty - x^2 = b$
3. Make c the subject $ac + d = m^2$
4. Make a the subject $x(a - e) = d$
5. Make y the subject $b(y - b) = b^2$
6. To find velocity, v, we use the formula
   $v^2 = u^2 - 2as$
   Rearrange to find s
7. The area of a sector of a circle is given by
   $A = \frac{\theta \pi r^2}{360}$
   Express θ in terms of A, π and r
8. Make x the subject $m(y - x) = t$

Rearranging and Functions

Original function

$f(x) = 3x + 2$

Inverse function

$f^{-1}(x) = \frac{x-2}{3}$

Find the inverse of each of these functions.

1. $f(x) = 3x - 5$
2. $f(x) = 4x + 7$
3. $f(x) = \frac{x}{2} + 1$
4. $f(x) = \frac{x + 2}{3}$
5. $f(x) = \frac{2}{3}x + 3$
6. $f(x) = 3 - 2x$

Further Factorising 2

1. Make y the subject of $xy + 6 = 7 - ky$
2. Find an expression for the area of a rectangle with length, $(y - x)$ and width, $(x - 2)$
3. Rewrite your expression in Q2 to have y expressed in terms of A and x
4. Make y the subject of $\frac{4}{y} + 1 = 2x$
5. Displacement can be expressed as
   i. $s = ut + \frac{1}{2}at^2$
   Express a in terms of s, u and t
6. Make y the subject of $\sqrt{by^2 - x} = D$
7. The area of a trapezium has formula
   i. $A = \frac{1}{2}\left(\frac{a+b}{h}\right)$
   Express h in terms of A, a and b
8. Make t the subject $b(t + a) = x(t + b)$

Solving with Quadratics 2

Solve the following

1. $x^2 - 4x - 12 = 0$
2. $x^2 - x = 6$
3. $2x^2 - 11x + 12 = 0$
4. $6x^2 + x - 12 = 0$
5. $3 + 2x - x^2 = 0$
6. $x^2 - 4x - 1 = 0$
7. $\frac{8}{x+2} - \frac{14}{x-3} = 9$
8. The area of this rectangle is $30m^2$

a) Show that $6x^2 + 5x - 34 = 0$
b) Find any possible values for x

SOLUTIONS

Fractions 1

1. 1001
2. $\frac{1}{3}$
3. $\frac{11x}{12}$
4. $\frac{1}{2}$
5. $\frac{16}{7}$
6. $\frac{1}{2}+\frac{1}{2}\ and \frac{1}{2}\div\frac{1}{2}$
7. $No, 31\frac{1}{5} > 30$
8. $\frac{8a-3b}{12}$

Indices 2

1. t^9
2. 8^5
3. 3^8
4. $\frac{1}{5}$
5. 2
6. 1
7. $\frac{1}{81}$
8. $\frac{9}{4}$

Surds 2

1. $4\sqrt{d}$
2. $8\sqrt{3b}$
3. 80
4. $5\sqrt{3}$
5. 1
6. $\frac{2\sqrt{10}}{5}$
7. $\sqrt{2}$
8. $30\ cm^2$

Expanding 2

1. $2y^2 - 3y$
2. $6x^3y - 4x^5$
3. $11x - 5$
4. $6\sqrt{2} - 8$
5. $y(y + 4)$ & $y^2 + 4y$
6. $6(2x + 8)\ or\ (12x + 48)\ cm^2$
7. $3a - 4t - 2$
8. $\frac{7a^2-52a}{24}$

Expanding 2

1. $2x^2 - x - 6$
2. $3x^2 + 13x + 12$
3. $2x^2 + 6x + 45$
4. $7 - 4\sqrt{3}$
5. $\frac{x^2+2x-9}{x(x+3)}$
6. $x^6 - 49$
7. $12x^3 + 14x^2 - 5x - 6$
8. $\frac{5x^2-6x+4}{3x(x+2)}$

Summary and review

1. $x^2 + \frac{1}{9}x - \frac{2}{27}$
2. $x^3 + 6x^2 + 11x + 6$
3. $x^3 + x^2 - 8x - 12$
4. $2\sqrt{3} - 4$
5. $x^3 - 12x^2 + 48x - 64$
6. $x^5 + x^4 - 4x - 4$
7. $y = 6 \quad b = 24$
8. $\frac{2x^3+3x^2-7x-14}{(x+3)(2x+1)}$

Factorising 2

1. $7(x + 4)$
2. $7(2 - 3x)$
3. $y(y - 8)$
4. $3t^2(t^2 + 3)$
5. $3xy(x^2 - 4y - 2)$
6. $2b(4a^3 + 3y^2 - 5)$
7. $(x + 3)(6x + 5)$
8. $(3 - 2y)(7y - 2)$

Further Factorising 2

1. $(x + 7)(x - 1)$
2. $(y + 4)(y - 3)$
3. $(y - 7)(y - 4)$
4. $(t + 9)(t - 2)$
5. $(k + 5)(k + 4)$
6. $(x + 8)(x - 7)$
7. $p(p - 25)$
8. $(3x - 4)(x^2 - 1)$

Difference of Two Squares

1. $(x - 6)(x + 6)$
2. $(y + 12)(y - 12))$
3. $(x + y)(x - y)$
4. $(2t - 9)(2t + 9)$
5. $(x + \sqrt{5})(x - \sqrt{5})$

Completing the square 2

1. $(x+5)^2-25$
2. $(x+5)^2+5$
3. $(y-1)^2-1$
4. $(y-1)^2+2$
5. $(x-4)^2+9$
6. $(k+7)^2-50$
7. $\left(y+\frac{5}{2}\right)^2-\frac{1}{4}$
8. $(t+3)^2$

Rearranging 2

1. $x=y+b+f$
2. $y=\frac{(b+x^2)}{t}$
3. $c=\frac{m^2-d}{a}$
4. $a=\frac{d}{x}+e$
5. $y=2b$
6. $s=\frac{v^2-u^2}{2a}$
7. $\theta=\frac{360A}{\pi r^2}$
8. $x=y-\frac{t}{m}$

Please note that there may be alternative correct expressions – check with your teacher

Rearranging Functions -

1. $f^{-1}(x)=\frac{x+5}{3}$
2. $f^{-1}(x)=\frac{x-7}{4}$
3. $f^{-1}(x)=2(x-1)$
4. $f^{-1}(x)=3x-2$
5. $f^{-1}(x)=\frac{3(x-3)}{2}$
6. $f^{-1}(x)=\frac{3-x}{2}$

Rearranging Factorising 2

1. $y=\frac{1}{x+k}$	2. $A=xy-x^2-2y+2x$	3. $y=\frac{2x-x^2-A}{(2-x)}$	4. $y=\frac{4}{2x-1}$
5. $\frac{2s-2ut}{t^2}$	6. $y=\pm\sqrt{\frac{D^2+x}{b}}$	7. $h=\frac{a+b}{2A}$	8. $t=\frac{xb-ba}{b-x}$

Solving Quadratics 2

1 $x=6$ *or* $x=-2$

2 $x=3$ *or* $x=-2$

3 $x=\frac{3}{2}$ *or* $x=4$

4 $x=-\frac{3}{2}$ *or* $x=\frac{4}{3}$

5 $x=3$ *or* $x=-1$

6 $x=2\pm\sqrt{5}$

7 $x=-\frac{1}{3}$ *or* $x=\frac{2}{3}$

8 $x=2$ $(Note\ x\neq-\frac{17}{6})$