

Mathematics in the Sixth Form



Summer Work

Wood Green School Mathematics Summer Work – Mathswatch and Revision Guide Assistance

If you cannot remember your login in for Mathswatch it will be your school email address without the “.org.uk” on the end. For example 15bloggs.j@wgsnitney . The password for everyone is “CubeRoot” (capital C and R with no spaces). If you cannot get in for any reason email Mr Gosnell (a.gosnell@wgsnitney.org.uk) who will help you.

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1. multiply out and simplify

(a) $a(2 + a)$

(b) $3(2a + b)$

(d) $3x(4 - x)$

(e) $4a(2 + 3a)$

(g) $4d(ab + d)$

(h) $2xy(x^2 + y^2)$

2. expand

(a) $(x + 1)(x + 2)$

(b) $(a + 3)(a + 4)$

(d) $(x - 1)(x + 2)$

(e) $(a - 2)(a + 1)$

(g) $(x - 3)(x - 5)$

(h) $(a - 3)(a - 1)$

3. expand

(a) $(x + 1)^2$

(b) $(y - 1)^2$

(d) $(2x - 3)^2$

(e) $(3y + 2)^2$

4. expand

(a) $(2x + 3)(3x - 1)$

(b) $(x - 1)(2x - 2)$

(d) $(4x - 2)(x + 5)$

(e) $(5x + 6)(7x - 1)$

5. expand

(a) $(x + 2)(x - 2)$

(b) $(x + 5)(x - 5)$

(d) $(4x - 3y)(4x + 3y)$

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

1. Factorise the following expressions into two pairs of brackets.

(a) $84 - a(a - 5)$

(b) $3 - 2p(4p + 5)$

(d) $a^2 + 2(a - 4)$

(e) $x^2 - 16$

(g) $9m^2 - 64$

(h) $4a^2 - 49$

(j) $2x^2 - 32$

(k) $3m^2 - 27$

2. Factorise the following expressions into two pairs of brackets.

(a) $2a^2 - 7a - 9$

(b) $x^2 - 15x - 54$

(d) $x^2 + 20x + 51$

(e) $a^2 + 7a - 44$

(g) $p^2 - 26p + 133$

(h) $m^2 - m - 90$

(j) $x^2 + 15x - 54$

(k) $p^2 + 24p + 143$

3. Factorise the following expressions into two pairs of brackets.

(a) $a^2 + 8 - 6a$

(b) $x^2 + 10x + 21$

(d) $x^2 + 20 - 9x$

(e) $a^2 - 6a - 27$

(g) $15 - 4p^2 - 4p$

(h) $x + 56 - x^2$

(j) $4x^2 + 7x - 2$

(k) $2 - x^2 + x$

1. multiply out

(a) $a^3 \times a^2$

(b) $b^3 \times b^4$

(d) $ab^3 \times a^3b$

(e) $b^3(ab^4)$

(g) $a^2b^3(a^2b^4 - ab)$

(h) $ab(a^2b + ab^2)$

2. simplify

(a) $\frac{a^3b^4}{ab}$

(b) $\frac{x^2y^3}{xy}$

(d) $\frac{a^2b - ab^2}{ab}$

(e) $\frac{x^3y^2 + x^2y^4}{xy}$

(g) $\frac{a^2b^3(a^3b^2)}{a^4b}$

(h) $\frac{x^3y^2(xy^2)}{x^4y}$

3. simplify

(a) $(a^2)^3$

(b) $(x^3)^4$

(d) $(ab)^2$

(e) $(xy)^3$

(g) $(a^3b^2)^5$

(h) $(x^2y^4)^2$

1. Express each fraction in its simplest form:

(a) $\frac{3(x+1)}{x+1}$

(b) $\frac{x-y}{y-x}$

(d) $\frac{y-2}{2-y}$

(e) $\frac{4x+8}{4}$

(g) $\frac{5x}{10+15x}$

(h) $\frac{5-2x}{4x-10}$

2. Express each fraction in its simplest form:

(a) $\frac{3x}{3x-9}$

(b) $\frac{15x+20x^2}{5x}$

(d) $\frac{x+3}{x^2+5x+6}$

(e) $\frac{x^2-y^2}{(x-y)^2}$

(g) $\frac{a^2-4a}{a^2-16}$

(h) $\frac{x^2+xy}{x^2-y^2}$

3. Express each fraction in its simplest form:

(a) $\frac{3}{x-1} + \frac{x}{x-1}$

(b) $\frac{3}{x-1} + \frac{x}{2x-3}$

(d) $\frac{x}{x+1} - \frac{3}{2x-1}$

(e) $\frac{6}{1-2a} - \frac{a}{3+a}$

4. Express each fraction in its simplest form:

(a) $\frac{x^2}{x^2-2x} \times \frac{3+x}{x}$

(b) $\frac{2x+2}{3x} \times \frac{12}{12x-8}$

(d) $\frac{x^2-y^2}{x} \div \frac{x+y}{x}$

(e) $\frac{a}{a^2-b^2} \div \frac{2a}{a-b}$

1. make x the subject in each case:

(a) $4y+7=11+x$ (b) $x-7y=13$

(d) $11+5x=13y+4x$ (e) $5x-2y=9+4x$

2. make y the subject in each case:

(a) $2x-y=5$ (b) $p-2y=5-q-3y$

(d) $p-y=5-q$ (e) $4y=9-x+3y$

3. make a the subject in each case:

(a) $4b+2c=a-b$ (b) $7a+2p=8a-3$

(d) $2p=3-a-q$ (e) $3-a-q=b$

4. make p the subject in each case:

(a) $2b+p-y=5-q$ (b) $p+q=4-a+2p$

(d) $p-5=2p-q$ (e) $3-5q=a-p$

5. make x the subject in each case:

(a) $q-7a-2x=5-x$ (b) $3xa=5yb$

(d) $3ya^2=5xc$ (e) $5a^2=\frac{3xb}{c}$

1. evaluate when $x = 1$, $y = 2$ and $z = 3$

(i) $3xy$

(ii) $2z$

(iv) $\frac{yz}{14}$

(v) $2y + 4z$

(vii) $yz + xz$

(viii) $y^2 + z^2$

(x) $2y^2 - z^3$

(xi) y^2z

2. evaluate when $p = 4$, $q = 5$ and $r = 6$

(i) $p^2 + q^3 - r^2 + 3pqr$

(ii) $(p - q + r)(2q - 4r)$

(iv) $\frac{p}{r} - \frac{q}{p} + \frac{r}{q}$

(v) $\frac{p-1}{3} - \frac{q-r}{2}$

(vii) $3p^2 + 2q - 2pq^2r$

(viii) $p^2 + 2q^3 - 2r^2$

(x) $\frac{p+2q}{r-q} - \frac{p+r}{p+q}$

(xi) $\frac{3r^2 + 2p}{pq-r} - \frac{2q}{r}$

1. solve for x and y

$$\begin{aligned} \text{(a)} \quad & 2x - y = 1 \\ & 2x + 2y = 10 \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & 2x + 3y = 8 \\ & 5x - 2y = 1 \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad & 5x - y = 15 \\ & x + y = -3 \end{aligned}$$

$$\begin{aligned} \text{(e)} \quad & 3x - y = 6 \\ & 2x + 5y = -13 \end{aligned}$$

$$\begin{aligned} \text{(g)} \quad & 2x - 5y = 3 \\ & 3x + 2y = 14 \end{aligned}$$

$$\begin{aligned} \text{(h)} \quad & 2x + 3y = 6 \\ & 3x + 2y = -1 \end{aligned}$$

2. solve for x and y

$$\begin{aligned} \text{(a)} \quad & 2x + 13 = 5y \\ & 3x + 4y - 15 = 0 \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & 3x + 2y - 14 = 0 \\ & 2x + 16 = 5y \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad & x + 5y - 2 = 0 \\ & 3y - 9 = 2x \end{aligned}$$

$$\begin{aligned} \text{(e)} \quad & 4x + 3y + 10 = 0 \\ & 5y - 18 = 2x \end{aligned}$$

3. John buys 20 postage stamps for £5.36 . If he only buys stamps of value 22p and 30p, how many of each kind did he buy?
4. If Mary and Tom put their money together they have £36 . If Mary's money were halved and Tom's money doubled they would have £42. How much money does each have?
5. A packet of razors and a bar of soap cost £5.50 . If the soap costs £2.50 less than the razors, find the cost of each.
6. James bought 2 bottles of lemonade and 1 bag of crisps for £1.40 .
Jill bought 1 bottle of lemonade and 3 bags of crisps for £1.70 .
How much is a bottle of lemonade? How much is a bag of crisps?

1. solve the following equations

(a) $(a-3)^2 = 16$

(c) $(2y+1)^2 - 16 = 0$

(e) $(x-5)^2 - 36 = 0$

2. solve the following equations

(a) $(3x+4)^2 - 81 = 0$

(c) $(2x-1)^2 = 25$

(e) $(2x+5)^2 = 9$

3. solve and answer to 1 d.p.

(a) $x^2 - 5x + 1 = 0$

(c) $x^2 - 4x + 2 = 0$

(e) $x^2 + 2x - 2 = 0$

1. Solve for x .

(a) $2a^2 - 7a - 9 = 0$

(b) $x^2 - 15x - 54 = 0$

(d) $x^2 + 20x + 51 = 0$

(e) $a^2 + 7a - 44 = 0$

(g) $p^2 - 26p + 133 = 0$

(h) $m^2 - m - 90 = 0$

(j) $x^2 + 15x - 54 = 0$

(k) $p^2 + 24p + 143 = 0$

2. Solve for x .

(a) $a^2 + 8 = 6a$

(b) $x^2 + 10x + 21 = 0$

(d) $x^2 + 20 = 9x$

(e) $a^2 = 6a + 27$

(g) $15 = 4p^2 + 4p$

(h) $x + 56 = x^2$

(j) $4x^2 + 7x = 2$

(k) $2 = x^2 - x$

3. Solve for x .

(a) $84 = a(a - 5)$

(b) $3 = 2p(4p + 5)$

(d) $a^2 + 2(a - 4) = 0$

(e) $x^2 - 16 = 0$

(g) $9m^2 = 64$

(h) $4a^2 = 49$

(j) $2x^2 = 32$

(k) $3m^2 = 27$

1. Solve the quadratic equations by using the formula, giving answers to 2 decimal places.

(a) $x^2 + 3x + 1 = 0$

(b) $x^2 + 4x + 1 = 0$

(d) $x^2 - 3x + 1 = 0$

(e) $x^2 - 4x + 1 = 0$

(g) $x^2 - 6x + 1 = 0$

(h) $x^2 + x - 1 = 0$

(j) $x^2 + x - 4 = 0$

(k) $x^2 + x - 5 = 0$

2. Solve the quadratic equations by using the formula, giving answers to 2 decimal places.

(a) $4 = x^2 + 2x$

(b) $5 = x^2 + 2x$

(d) $3 = x^2 + 3x$

(e) $5 = x^2 + 3x$

(g) $3 = x^2 + 4x$

(h) $4 = x^2 + 4x$

(j) $1 = x^2 + 5x$

(k) $2 = x^2 + 5x$

3. Solve the quadratic equations by using the formula, giving answers to 2 decimal places.

(a) $2x^2 + 6x + 3 = 0$

(b) $2x^2 + 7x + 3 = 0$

(d) $4 - 6x = 2x^2$

(e) $2x^2 = 4 - 5x$

4. A rectangular box has dimensions $(x + 6)$ cm by $(x + 5)$ cm by 10 cm.

If the box has a volume of 1 litre, what is the value of x ?

(answer to 2 decimal places)

5. A rectangular box has dimensions in cm of height x , width $(x - 2)$ and length $3x$.

If the surface area of the box is 300 square cm, what is the value of x ?

(answer to 2 decimal places)

1. Solve for x and represent your answer on a number line.

(a) $5x - 3 > 7$

(b) $3x - 2 > 5$

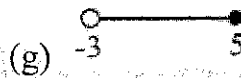
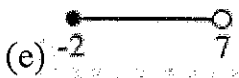
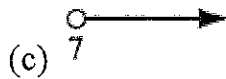
(d) $2x + 5 \leq 2$

(e) $3x + 7 \geq 1$

(g) $\frac{x-3}{3} > 9$

(h) $\frac{2x+5}{2} \leq 6$

2. For each number line describing x write down the inequality.



3. Solve for x .

(a) $6 \leq x + 3 < 9$

(b) $3 \leq x + 2 < 5$

(d) $-3 < 2x + 1 < 5$

(e) $-1 < 2x + 6 \leq 8$

(g) $-7 < x - 2 \leq -5$

(h) $-6 > 3x + 2 \geq -10$

(j) $5 < \frac{2x+1}{5} \leq 10$

(k) $6 \leq \frac{x-1}{3} < 24$

1. Write down the straight line equation from the information given.

(m - gradient, i - intercept on y-axis)

(a) $m = 3, i = 4$

(b) $m = 2, i = -1$

(d) $m = -2, i = 1$

(e) $m = 4, i = -3$

(g) $m = 7, i = -4$

(h) $m = -2, i = -5$

(j) $m = 6, i = 7$

(k) $m = 9, i = -10$

2. For each equation write down the gradient and intercept on the y-axis.

(a) $y = 3x + 4$

(b) $y = x - 1$

(d) $y = 5x + 1$

(e) $y = x - 6$

(g) $y = 3x - 9$

(h) $y = 2(x - 4)$

(j) $y = 3(2x - 1)$

(k) $2y = 2x - 3$

3. Find the equation of the line that passes through the following points.

(a) (0,0) (2,3)

(b) (0,0) (-3,-4)

(d) (1,0) (-3,1)

(e) (1,0) (2,-1)

(g) (-1,0) (1,4)

(h) (-3,-2) (2,2)

(j) (-1,-1) (-2,-6)

(k) (-6,-2) (-4,-7)

4. For each equation write down the intercept on the x-axis.

(a) $y = x + 6$

(b) $y = 2x - 8$

(d) $y = x + 3$

(e) $y = 5x - 2$

(g) $y = 5 - x$

(h) $2y = 4 + 3x$