GRAYS TUITION CENTRE – Online Tutoring

WEEK: 13

Week Beginning: (15/03/2021)

Subject: MATHS

Year: Higher years

Lesson Objective:

- Getting use to algebraic expressions and be able to form linear equations
- Sometimes, some equations have more than one unknown and therefore require rearranging of equations in order to solve some of them
- Getting comfortable with rearranging and performing logical mathematical operations

Class Worksheets

- Pages 162 - 168 GCSE Maths 4-9 Elmwood (Blue book)

Homework

- Complete any remaining classwork for homework

Additional Notes

- All homework from last week will be marked at the beginning of the lesson. Make sure that you have your homework with you in the lesson and are ready to mark it
- Also prepare any questions if you struggled with the homework so I can help you.
- All lesson worksheets and homework for next week (**due Week 14**) worksheets can be found below

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M Setting up linear equations

Many problems can be solved by writing them as linear equations first.
The unknown quantity is often chosen to be x.

The sum of four consecutive numbers is 42. Let the first number be x and write down the other three numbers in terms of x. Find the four numbers.
Other three numbers are $(x + 1)$, $(x + 2)$ and $(x + 3)$.

Sum is 42 so $x + (x + 1) + (x + 2) + (x + 3) = 42$

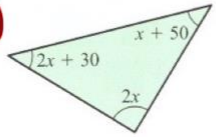
$4x + 6 = 42$

$4x = 36$

$x = 9$

The four numbers are 9, 10, 11 and 12.

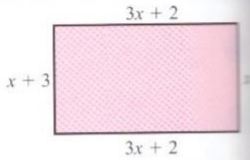
M6.4

1 

(a) Write down an equation using the angles.
(b) Find x.
(c) Write down the actual value of each angle in this triangle.

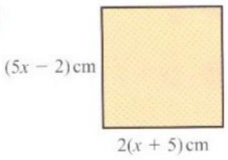
2 The sum of four consecutive numbers is 78. Let the first number be x.
Set up an equation to find x then find the four numbers.

3 The perimeter of this rectangle is 58 cm.



(a) Write down an equation using the perimeter.
(b) Find x.
(c) Write down the actual length and width of the rectangle.

4 A rectangle has its length twice its width. If its perimeter is 42 cm, find the width of the rectangle.

5 

Work out the actual perimeter of this square.

6 £190 is divided between Jack and Halle so that Jack receives £72 more than Halle. How much does each person get? (Hint: Let x = Halle's money.)

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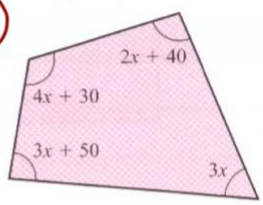


(a) Write down an equation using the angles.

(b) Find x.

(c) Write down the actual value of each angle in this quadrilateral.

8 The length of a rectangle is 3 times its width. If the perimeter of the rectangle is 32 cm, find its length and width.

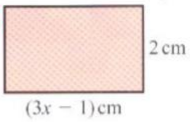
9 A triangle has 2 angles which are each 4 times the size of the third angle. Find the size of each angle.

10 The sum of four consecutive odd numbers is 216.

(a) If x is the smallest number, write down the other numbers in terms of x.

(b) Find the actual numbers.

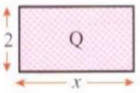
11



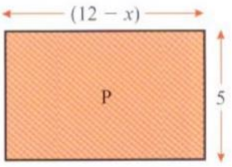
The area of the rectangle is 46 cm^2. Find the perimeter of the rectangle.

12 You have three consecutive *even* numbers so that the sum of twice the smallest number plus three times the middle number is four times the largest number. Find the three numbers.

13



The area of rectangle P is five times the area of rectangle Q. Find x.



Can you still?

Mixed

1 Evaluate

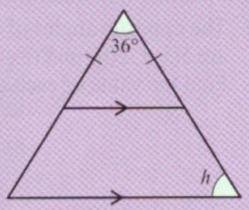
(a) 2^{-1} (b) 3^{-2} (c) $\left(\frac{1}{9}\right)^{-\frac{1}{2}}$

2 Factorise

(a) $ac - bc - ad + bd$

(b) $12x^2 - x - 6$

3 Find the value of angle h.



4 AB = $\frac{1}{4}$ cm and CD = $\frac{2}{3}$ cm. Write down the ratio AB:CD in the form m:n where m and n are integers.

5 Solve $8^{\frac{1}{3}} = 32$

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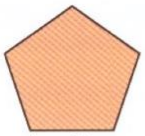
Homework: M6.4 – Question 15 onwards – do all circled questions

14 

Each side of the regular pentagon is $(x - 1)$ cm.

Each side of the square is 4 cm more than one of the pentagon sides.

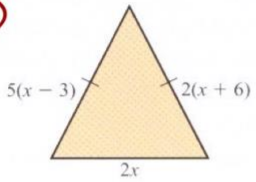
Find the actual perimeter of the square if the perimeter of the square is equal to the perimeter of the pentagon.

15 It is given that $P = \frac{1}{3}(4x - 8)$.

A value of x is used so that the value of P is equal to x.
Find this value of x.

16 There are 3 children in a family.
Each is 3 years older than the next and the sum of their ages is 21.
How old is each child?

17 The opposite angles of a cyclic quadrilateral are $5(x + 20)°$ and $(3x - 20)°$.
Find the value of each angle.

18 

Find the actual perimeter of this isosceles triangle.
All lengths are given in cm.

19 Ricky leaves home at 18:00 and arrives at a pub at 18:54.
He travels a distance of 10 km. He cycles part of the way at 20 km/h but then gets a puncture. He walks the rest of the way to the pub at 4 km/h.
How far did he have to walk?

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equal

hen

M Changing the subject of a formula

M6.5

Copy and complete each statement below:

1. If $a = 6b$ then $\frac{a}{\square} = b$

2. If $a = \frac{b}{8}$ then $\square\, a = b$

3. If $m = \frac{n}{p}$ then $n = \square\, p$

4. Make x the subject of each formula given below:

   (a) $y = x - 9$ (b) $y = \frac{x}{12}$ (c) $y = x + 20$ (d) $y = 8x$

   (e) $y = \frac{x}{3}$ (f) $y = x + b$ (g) $y = mx$ (h) $y = x - w$

5. Copy and fill each box below:

   (a) $x = 3y + 2$

   $x - \square = 3y$

   $\frac{x - \square}{\square} = y$

   (b) $x = 4y - 9$

   $x + \square = 4y$

   $\frac{x + \square}{\square} = y$

6. Make x the subject of each formula given below:

   (a) $y = 2x + 8$ (b) $y = 6x - 5$ (c) $y = 8x - 10$

   (d) $y = \frac{x}{3} + 2$ (e) $y = \frac{x}{5} - 6$ (f) $y = \frac{x}{2} - 4$

7. Make x the subject of each formula given below:

   (a) $y = px + q$

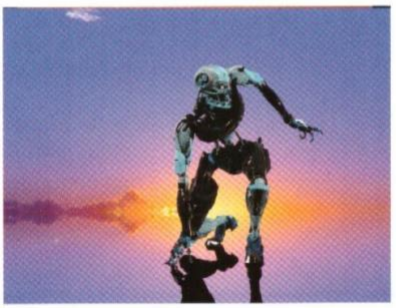
   (b) $y = cx - h$

   (c) $y = rx - 2p$

   (d) $q = cx + 3s$

   (e) $bx + 5c = 2f$

   (f) $y = ax + b - c$



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8 Make x the subject of each formula given below:

(a) $c(x + d) = y$ (b) $m(x - n) = q$ (c) $r(x + 5) = y$

(d) $a(x + 7) = 3b$ (e) $y = f(x - g)$ (f) $4b = s(x - t)$

9 Make x the subject of each formula given below:

(a) $\frac{ax + d}{4} = e$ (b) $\frac{bx + 3c}{y} = p$ (c) $\frac{ax - r}{5} = q$

(d) $y = \frac{cx - 2d}{7}$ (e) $y = \frac{ax - 3c}{b}$ (f) $\frac{px + qr}{8} = y$

10 $h = 3g + m$. Make g the subject of the formula.

11 $x = u + fy$. Make y the subject of the formula.

12 Make x the subject of the formula $y = \frac{cx - 3}{a}$

13 Make b the subject of the formula $y = \frac{3(b + c)}{m}$

Powers and more fractions

(a) Make w the subject of the formula $w^2 = a + 6$.

$w^2 = a + 6$

$w = \sqrt{(a + 6)}$

(b) Make x the subject of the formula $\sqrt[3]{(x - b)} = c$

$\sqrt[3]{(x - b)} = c$

$x - b = c^3$

$x = c^3 + b$

(c) Make n the subject of the formula $\frac{4n^3}{p} + q = rx$.

$\frac{4n^3}{p} + q = rx$ [subtract q from both sides of the equation]

$\frac{4n^3}{p} = rx - q$ [multiply both sides of the equation by p]

$4n^3 = p(rx - q)$ [divide both sides of the equation by 4]

$n^3 = \frac{p(rx - q)}{4}$ [cube root both sides of the equation to remove the cube]

$n = \sqrt[3]{\frac{p(rx - q)}{4}}$

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M6.6

1 Copy and complete:

(a) $x^2 - w = z$

$x^2 = z + \square$

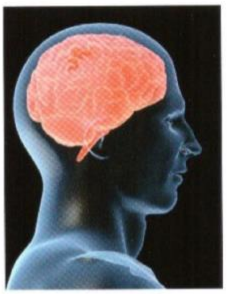
$x = \sqrt{(z + \square)}$

(b) $3c = p - m^3$

$\square + m^3 = p$

$m^3 = p - \square$

$m = \sqrt[3]{(p - \square)}$



(c) $m\sqrt{y} = 4n$

$\sqrt{y} = \dfrac{4n}{\square}$

$y = \left(\dfrac{4n}{\square}\right)^2$

2 Make x the subject of each formula given below:

(a) $x^2 + 7 = b$ (b) $z = x^2 - t$ (c) $q + x^2 = 4p$

(d) $x^3 - a = c$ (e) $r = qx^3$ (f) $bx^2 = n$

(g) $\dfrac{x^2}{b} = c$ (h) $\sqrt{x} = m - n$ (i) $p + 2q = \sqrt[3]{x}$

(j) $\dfrac{\sqrt[3]{x}}{w} = y$ (k) $a = b\sqrt{x}$ (l) $2m = n - \sqrt{x}$

3 Copy and complete:

(a) $p = \sqrt{(x + q)} - r$

$p + \square = \sqrt{(x + q)}$

$(p + \square)^2 = x + q$

$(p + \square)^2 - \square = x$

(b) $\dfrac{\sqrt{A}}{3B} - M = N$

$\dfrac{\sqrt{A}}{3B} = N + \square$

$\sqrt{A} = \square\,(N + \square)$

$A = (\square\,(N + \square))^2$

4 Make n the subject of each formula given below:

(a) $\sqrt{(n - r)} = p$ (b) $\sqrt{(n + 2r)} = 3q$ (c) $b = \sqrt[3]{(n + 5c)}$

(d) $(n + t)^2 = w$ (e) $(n - q)^2 + y = 2p$ (f) $8h = \sqrt{(n - g)} + m$

(g) $w = \sqrt{(y - n)}$ (h) $\sqrt{(n - h)} - 4k = 3m$ (i) $\dfrac{\sqrt{n}}{5} + c = d$

(j) $y = \dfrac{\sqrt{n}}{z} - 2w$ (k) $b = \dfrac{n^2}{e} + 3c$ (l) $\dfrac{(n - w)^3}{xz} = y$

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Optional homework:

5 Copy and complete:

(a) $\frac{M}{N} + Q = 3R$

$\frac{M}{N} = 3R - \square$

$M = (3R - \square)\square$

$\frac{M}{3R - \square} = \square$

(b) $\frac{v}{x - w} = y$

$v = y(x - \square)$

$v = xy - \square$

$v + \square = xy$

$\frac{v + \square}{y} = x$

Can you still?

Brackets

Expand and simplify:

1 $6(3y + 2) - 5(2y + 1)$

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

3 $(n - 4)(n + 1)$

4 $(w - 5)(w - 2)$

5

The rectangles have the same area.
Find the actual total area of the 2 rectangles.
All lengths are in cm.

6 Show that
$(x + 5)(x + 3)(x - 1) \equiv x^3 + 7x^2 + 7x - 15$

6 Make w the subject of each formula given below:

(a) $\frac{m}{w} = q$

(b) $c = \frac{n}{w}$

(c) $3a = \frac{2m}{w}$

(d) $\frac{x}{w} - z = m$

(e) $\frac{2a}{w} + 3c = b^2$

(f) $q = \frac{r}{w} + 5n$

(g) $\frac{3d}{w} + 4c = 5a^2$

(h) $3r = q - \frac{t}{w}$

(i) $\frac{a}{w + c} = b^3$

(j) $\frac{c^2}{3a + w} = f$

(k) $5m = \frac{k}{w - 4n}$

(l) $\frac{m}{n + w} = 6p^2$

7 $\frac{f(e - h)}{m} = y$. Make e the subject of the formula.

8 $\sqrt[3]{\left(\frac{x}{y}\right)} = w$. Make y the subject of the formula.

9 Make v the subject of the formula $\sqrt{(v^2 + n)} = m$

10 Make x the subject of the formula $\sqrt[3]{(w^2 - x^2)} = n$

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