

GRAYS TUITION CENTRE – Online Tutoring

WEEK: 5

Week Beginning: (18/01/2021)

Subject: MATHS

Year: 11

Lesson Objective:

- To revisit basic key concepts involving setting up & solving linear equations
- To become proficient in rearranging linear equations & making the subject
- To analyse contextual questions

Class Worksheets

- Pages 158-170, Maths GCSE 4-9 (ELMWOOD)
- Pages in the lesson pack

Homework

- The homework can be found at the end of this lesson pack in the homework section
- The 3 last worksheets in the attached lesson plan

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.
- Homework due Week 6.

Solve the following equations:

17 $7n + 6 = 34$

18 $3x - 8 = 22$

19 $8p - 4 = 84$

20 $4b + 9 = 5$

21 $6w + 10 = 5$

22 $9a + 4 = -32$

23 $8 = 33 + 5x$

24 $-6 = 9 + 3c$

25 $20 = 48 - 7x$

26 $10n + 2 = 7n + 14$

27 $7b - 3 = 4b + 12$

28 $8x - 22 = 2x + 8$

29 $5a + 2 = 3 - 2a$

30 $2p - 8 = 12 - 3p$

31 $9m + 4 = 3m - 1$

32 $11 - 5y = 26 - 2y$

33 $23 - 7x = 35 - 13x$

34 $\frac{b}{2} + 9 = 19$

35 $\frac{w}{3} + 12 = 19$

36 $\frac{a}{5} - 2 = 3$

37 $\frac{n}{6} + 3 = -2$

38 $\frac{3x}{4} = 6$

39 $\frac{3c}{5} - 4 = 2$

40 $9 = 3 - \frac{m}{2}$

41 $7 = 4 + \frac{a}{5}$

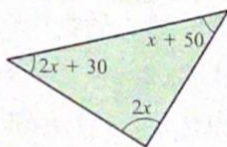
42 $\frac{x}{4} = \frac{2}{3}$

43 $\frac{3}{5} = \frac{n}{7}$

44 $\frac{21}{x} = -3$

M6.4

1



- Write down an equation using the angles.
- Find x .
- Write down the actual value of each angle in this triangle.

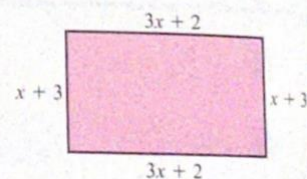
2

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.

- Write down an equation using the perimeter.
- Find x .
- Write down the actual length and width of the rectangle.

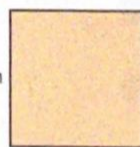


4

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

5

$(5x - 2)$ cm



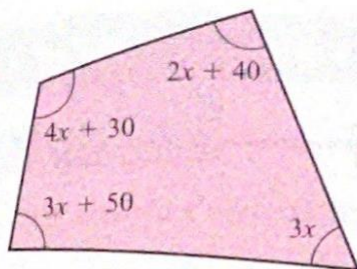
$2(x + 5)$ cm

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.)

7



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

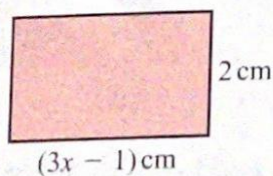
- 8 The length of a rectangle is 3 times its width. If the perimeter of the rectangle is 32 cm, find its length and width.

- 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.

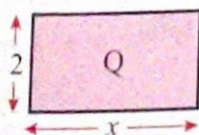
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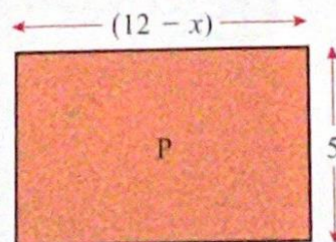
The area of the rectangle is 46 cm^2 . Find the perimeter of the rectangle.

- 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

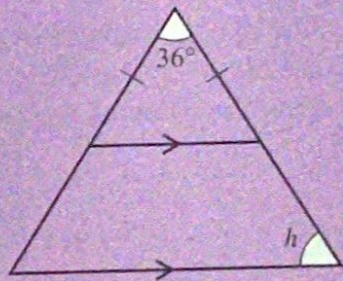


The area of rectangle P is five times the area of rectangle Q. Find x .



Can you still?

Mixed

- Evaluate
 (a) 2^{-1} (b) 3^{-2} (c) $\left(\frac{1}{9}\right)^{-\frac{1}{2}}$
- Factorise
 (a) $ac - bc - ad + bd$
 (b) $12x^2 - x - 6$
- Find the value of angle h .

- $AB = \frac{1}{4} \text{ cm}$ and $CD = \frac{2}{3} \text{ cm}$. Write down the ratio $AB:CD$ in the form $m:n$ where m and n are integers.
- Solve $8^{\frac{1}{3}} = 32$

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

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

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



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) $\frac{x^2}{b} = c$

(h) $\sqrt{x} = m - n$

(i) $p + 2q = \sqrt[3]{x}$

(j) $\frac{\sqrt[3]{x}}{w} = y$

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

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

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

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

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) $\frac{\sqrt{n}}{5} + c = d$

(j) $y = \frac{\sqrt{n}}{z} - 2w$

(k) $b = \frac{n^2}{e} + 3c$

(l) $\frac{(n - w)^3}{xz} = y$



Key Facts

Collect all the terms containing the required subject on the same side of the equation and all the other terms on the other side of the equation.

The required subject usually has to be extracted as a *common factor* before it is finally isolated.

- (a) Make m the subject of the formula $km + n = p - qm$

$$km + n = p - qm$$

$$km + qm = p - n$$

$$m(k + q) = p - n$$

$$m = \frac{p - n}{k + q}$$

- (b) Make x the subject of the

formula $\frac{mx - ny}{fx} = k$

$$\frac{mx - ny}{fx} = k$$

$$mx - ny = kfx$$

$$mx - kfx = ny$$

$$x(m - kf) = ny$$

$$x = \frac{ny}{m - kf}$$

M6.7

- 1 (a) Continue the working to make b the subject of the formula

$$a^2b - c = fb + h^2.$$

$$a^2b - fb = h^2 + c$$

$$b(a^2 - f) = h^2 + c$$

$$b = \dots$$

- 2 Make m the subject of the formula $P = \frac{mn}{m + n}$

- 3 Make a the subject of the formula $Y = \frac{3ab}{b - a}$

- (b) Make x the subject of the

formula $\frac{mx - k}{p - qx} = r$

[Begin by multiplying both sides by $(p - qx)$]

H/W Section

Solve the following equations:

15 $7(x - 1) = 2(2x + 4)$

17 $3(a + 2) = 4(1 - a)$

19 $5(2 - p) = 2(4 + 2p)$

21 $4(a - 2) = 3(a + 3) - 4$

23 $6(2x + 5) + 3(2 - 3x) = x$

25 $7(2h + 1) - 1 = 5(3h + 2)$

27 $4(2y + 1) - 9(y - 1) = 3$

29 $2(b + 1) + 1 = 3(3b - 5) - 10$

31 $\frac{1}{2}(4y + 1) - \frac{3}{4}(2y + 3) = \frac{3}{4}$

16 $8(w - 3) = 4(3 - w)$

18 $3(2n + 1) = 4(7 - n)$

20 $2(3 - 2m) = 5(2 - m)$

22 $3(2q + 3) + 4(q - 2) = 8$

24 $5(c - 2) + 1 = 3(c - 1)$

26 $2(4w - 3) - 7(2w - 7) = 1$

28 $3(x + 1) + 1 = 2(2x + 1) - 3$

30 $\frac{1}{6}(x - 14) = 2(x - 3)$

32 $\frac{1}{3}(2w - 5) + \frac{1}{6}(w - 4) = 1$

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 $P = \frac{1}{3}(4x - 8)$.

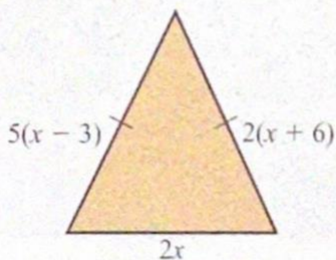
A value of x is used so that the value of P is equal to x .
Find this value of x .

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 $5(x + 20)^\circ$ and $(3x - 20)^\circ$.
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?

4 Make x the subject of each formula given below:

(a) $fx + g = dx + e$ (b) $xy - wx = wz + y$ (c) $ax - b = 3c - bx$

(d) $m(x - y) = n(x + z)$ (e) $c(d - x) = b + fx$ (f) $y^2x = 3z - wx$

(g) $t + sx = p(x - r)$ (h) $\frac{a + bx}{dx - a} = c$ (i) $\frac{f - x}{g + kx} = m$

(j) $z = \frac{yx - 4}{x}$ (k) $\frac{mx + c}{kx + d} = n$ (l) $f = \frac{s - rx}{5x + d}$

5 Make x the subject of the formula $px - q + qx = r(q - x)$

6 (a) Make n the subject of the formula $\sqrt{\frac{m + n}{2m - n}} = p$ (b) Make f the subject of the formula $\frac{k}{3} = \frac{f + 2g}{g - f}$

[Start by squaring both sides]

7 Make w the subject of each formula given below:

(a) $\sqrt[3]{\frac{w + y}{w + 2y}} = z$ (b) $q = \sqrt{\frac{ax - w}{bw + c}}$ (c) $3y = \sqrt{\frac{w}{w - z}}$

(d) $\left(\frac{a - w}{w + c}\right)^2 = b$ (e) $z = \left(\frac{b + cw}{b - w}\right)^2$ (f) $\frac{mw}{n - pw} = \frac{2}{5}$

(g) $\frac{a}{b} = \frac{dw + m}{w - n}$ (h) $\frac{2p}{q} = \sqrt{\frac{aw}{w - b}}$ (i) $\sqrt[3]{\frac{mw + 1}{pw - 1}} = 2n$

8 Make m the subject of the formula $\frac{c - tm}{3p} = zm + 4$

9 Make x the subject of the formula $p - qx = \frac{nx + r^2 - wx}{m}$