SUBJECT:

UNIT: Solving

Solving Equations

Knowledge Organiser

One unknown

Solve 2x + 3 = 9

-3 -3
2x = 6
÷2 ÷2
x = 3

Solve 3x - 5 = 4

+4 +4
3x = 9
÷3 ÷3
x = 3

Solve 3x + 2 = - 7

-2 -2
3x = -9
÷3 ÷3
x = -3

Solve 2(x + 1) = 9

2x + 2 = 9
-2 - 2
2x = 7
÷2 ÷2
x = 3.5

Find the area of the square

13

3x + 4

3x + 4 = 13
-4 -4
3x = 9
÷3 ÷3
x = 3

Two unknowns

Solve 2x + 1 = x + 9

-1 -1
2x = x + 8
-x -x
x = 8

Solve 2x - 2 = x + 4

+2 +2
2x = x + 6
-x -x
x = 6

Solve 2x + 4 = x - 7

-4 -4
2x = x + 11
-x -x
x = 11

Solve 4x + 1 = x + 10

-1 - 1
4x = x + 9
-x -x
3x = 9
x = 3

Find the area of the square

2x + 4

x + 8

2x + 4 = x + 8
-4 -4
2x = x + 4
-x -x
x = 4

If x = 4 then
2 x 4 + 4 = 12
And
4 + 8 = 12

Answer =
12 x 12 = 144

SUBJECT:
UNIT: Setting up and solving

Setting up equations & simultaneous equations

Knowledge Organiser

Key Words

- equation
- solve
- simultaneous

Solving Equations

Solve 2x + 1 = 7

-1 -1
2x = 6
÷2 ÷2
x = 3

Solve 2x + 3 = x + 6

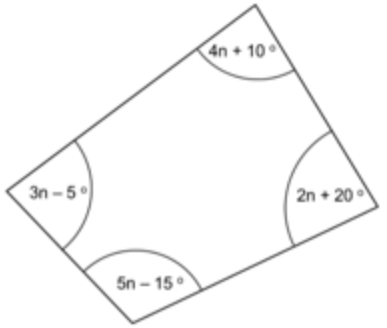
-3 -3
2x = x + 3
-x -x
x = 3

Solve 3x - 2 = x + 6

+2 +2
3x = x + 8
-x -x
2x = 8
+2 +2
x = 4

Setting up and solving equations

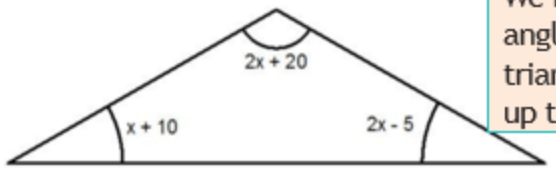
Find the value of n



We know that angles in quadrilaterals add up to 360°

3n - 5 + 5n - 15 + 4n + 10 + 2n + 20 = 360
14n + 10 = 360
14n = 350
n = 25°

Find the value of x



We know that angles in triangles add up to 180°

x + 10 + 2x + 20 + 2x - 5 = 180
5x + 25 = 180
5x = 155
x = 31°

Simultaneous Equations

Remember STOP
Same-sign, take away, opposite-sign, plus

1) 6x + y = 26
+ 2x - y = 6
8x = 32
x = 4
Substitute in x = 4
8 - y = 6
y = 2

2) 6x + y = 27
- 4x + y = 11
2x = 16
x = 8
Substitute in x = 8
32 + y = 11
y = -21

Problem Solving

A lamp and a bulb together cost £32.

The lamp costs £30 more than the bulb.

How much does the bulb cost?

Let the lamp = L
Let the bulb = B

L + B = 32
B + 30 = L

(B + 30) + B = 32
2B + 30 = 32
2B = 2
B = 1
If B = 1 then L + 1 = 32
So L = 31

SUBJECT:
UNIT: Expanding & Factorising

Expanding & Factorising

Knowledge Organiser

Key Words

- Expanding
- Factorising

Expanding & Factorising Single Brackets

Expand 2(x + 1)

= 2x + 2

Expand 3(2x - 4)

= 6x - 12

Expand 4x(2x - 5)

= $8x^2 - 20x$

Factorise 6x + 12

= 6(x + 2)

Factorise $x^2 + 3x$

= x(x + 3)

Factorise 30x + 40

= 10(3x + 4)

Expanding Double Brackets

$(x+2)(x+3)$

$(x+2)(x+3)$

$= x^2 + 3x + 2x + 6$

$= x^2 + 5x + 6$

$(x+5)(x-7)$

$(x+5)(x-7)$

$= x^2 - 7x + 5x - 35$

$= x^2 - 2x - 35$

$(x+4)^2$

$(x+4)^2$

$= (x+4)(x+4)$

$= x^2 + 4x + 4x + 16$

$= x^2 + 8x + 16$

$(x-7)(x-3)$

$(x-7)(x-3)$

$= x^2 - 3x - 7x + 21$

$= x^2 - 10x + 21$

Find the area

x - 2

4x + 3

To find the area of a rectangle we need to multiply

$(4x+3)(x-2)$

$(4x+3)(x-2)$

$= 4x^2 - 8x + 3x - 6$

$= 4x^2 - 5x - 6$

Factorising Double Brackets

Factorise $x^2 + 7x + 10$

We need to find two numbers that multiply to give 10 and add to give 7. List the factors of 10:

1 x 10

5 x 2...(5 + 2 = 7)

Answer = (x + 2)(x + 5)

Factorise $x^2 + 2x - 8$

We need to find two numbers that multiply to give -8 and add to give 2. List the factors of -8:

1 x -8

-1 x 8

2 x -4

4 x -2 ...(4 + -2 = 2)

Answer = (x + 4)(x -2)

SUBJECT:
UNIT: Ratio

Ratio

Knowledge Organiser

Key Words

- Simplify
- Share
- Ratio

Ratio & Fractions

Write 1:3 as fractions

There are 4 parts altogether:

$$\frac{1}{4} : \frac{3}{4}$$

Write 2:6 as fractions

There are 8 parts altogether:

$$\frac{2}{8} : \frac{6}{8}$$

Simplifying Ratio

Simplify 6: 12

÷6 ÷6

1:2

Simplify 12: 18

÷6 ÷6

2:3

Simplify 3: 15

÷3 ÷3

1:2

Simplify 18: 27

÷9 ÷9

2:3

Simplify 10: 20

÷2 ÷2

1:2

Simplify 32: 48

÷8 ÷8

4:6

'More than' Questions

Sarah and Jim share some money in the ratio 2:4. Jim gets £10 more than Sarah. How much does Sarah get?

Jim gets 2 parts and £10 more.
2 parts = £10
1 part = £5
So Sarah = 2 x £5 = £10

Sarah and Jim share some money in the ratio 1:5. Jim gets £20 more than Sarah. How much does Sarah get?

Jim gets 4 parts and £20 more.
4 parts = £20
1 part = £5
So Sarah = 1 x £5 = £5

Sharing Ratio

Split £20 into the ratio 2:3

2 + 3 = 5
20 ÷ 5 = 4 (1 part)
2 x 4: 3 x 4
8: 12

Split £100 into the ratio 5:7:8

5 + 7 + 8 = 20
100 ÷ 20 = 5 (1 part)
5 x 5 : 7 x 5: 8 x 5
25:35:40