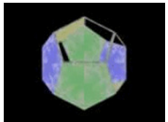


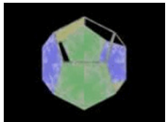
Mathematics

Year 6



Level 6

Number and Algebra

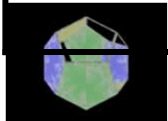


Solve the equation

$$x^3 + x = 20$$

Using trial and improvement and give your answer to the nearest tenth

Guess	Check	Too Big/Too Small/Correct

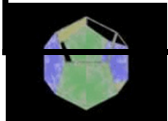


Solve the equation

$$x^3 + x = 20$$

Using trial and improvement and give your answer to the nearest tenth

Guess	Check	Too Big/Too Small/Correct
3	$3^3 + 3 = 30$	Too Big

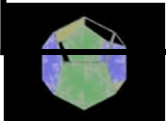


Solve the equation

$$x^3 + x = 20$$

Using trial and improvement and give your answer to the nearest tenth

Guess	Check	Too Big/Too Small/Correct
3	$3^3 + 3 = 30$	Too Big
2	$2^3 + 2 = 10$	Too Small

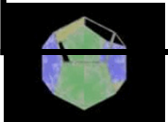


Solve the equation

$$x^3 + x = 20$$

Using trial and improvement and give your answer to the nearest tenth

Guess	Check	Too Big/Too Small/Correct
3	$3^3 + 3 = 30$	Too Big
2	$2^3 + 2 = 10$	Too Small
2.5	$2.5^3 + 2.5 = 18.125$	Too Small
2.6		



Amounts as a %

- Fat in a mars bar 28g out of 35g. What percentage is this?

Write as a fraction

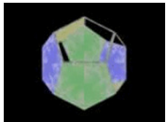
- $=\frac{28}{35}$

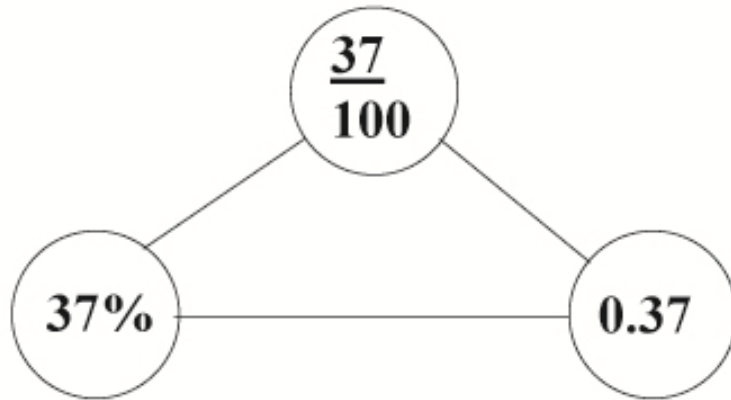
top \div bottom
converts a
fraction to a
decimal

Convert to a percentage (top \div bottom \times 100)

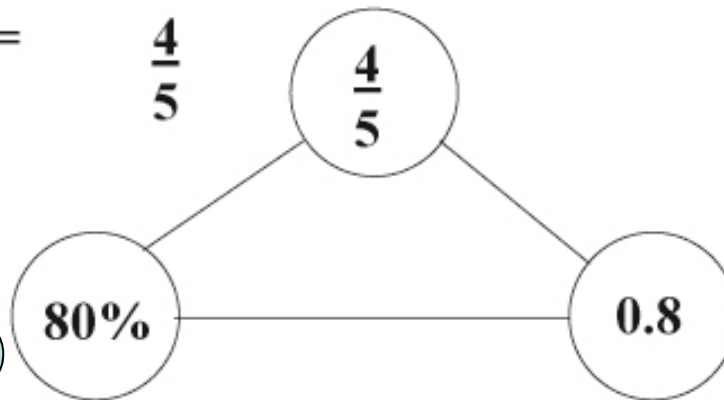
- $28 \div 35 \times 100 = 80\%$

Multiply by 100
to make a decimal
into a percentage

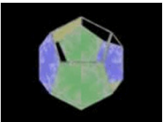


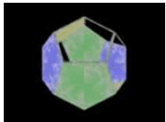
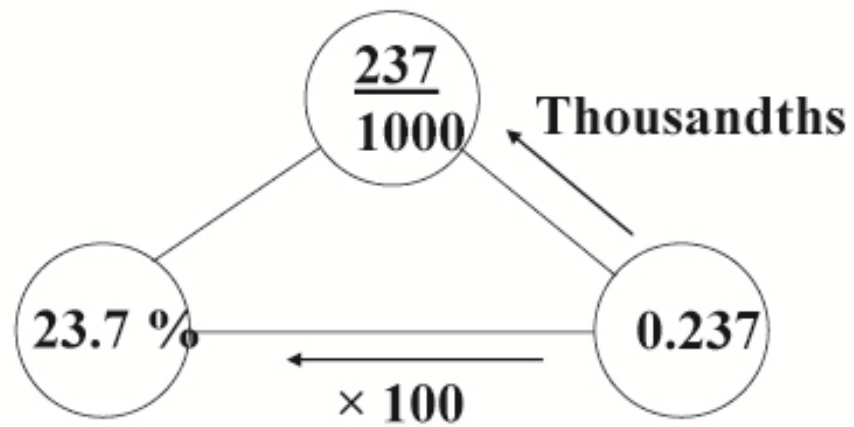
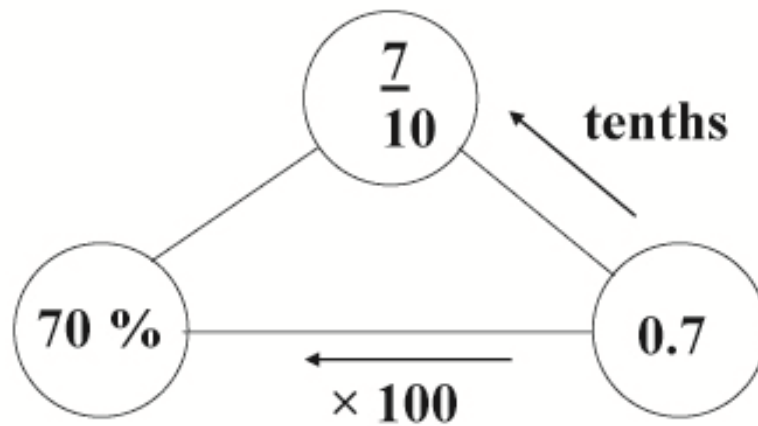


$$\frac{80}{100} = \frac{8}{10} = \frac{4}{5}$$



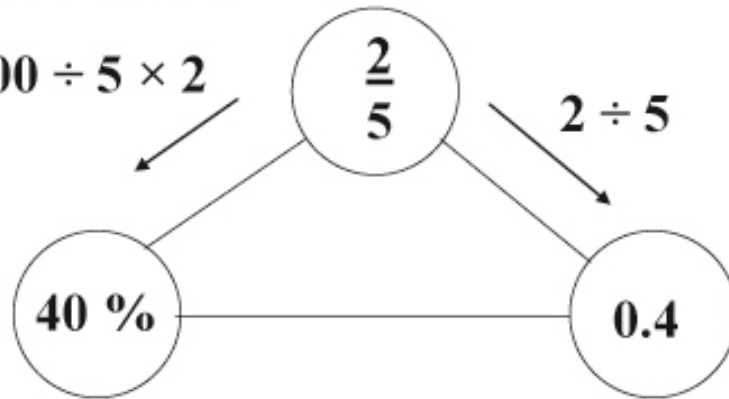
A percentage is a fraction out of 100





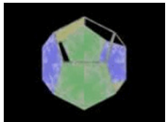
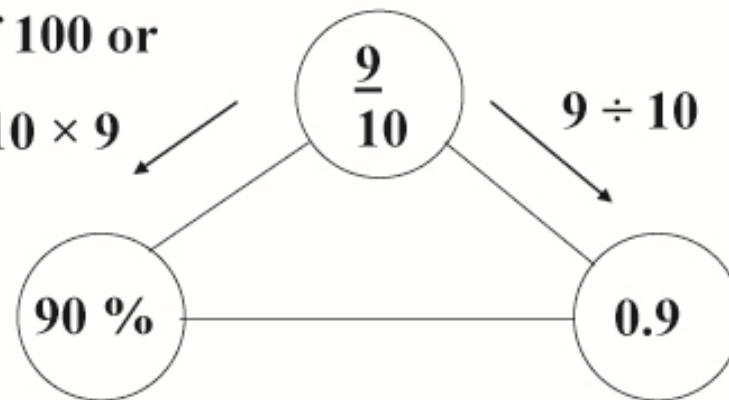
$\frac{2}{5}$ of 100 or

$100 \div 5 \times 2$



$\frac{9}{10}$ of 100 or

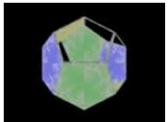
$100 \div 10 \times 9$



The ratio of boys to girls in a class is **3:2**

Altogether there are **30** students in the class.

How many boys are there?



The ratio of boys to girls in a class is 3:2

Altogether there are 30 students in the class.

How many boys are there?

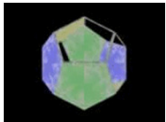
The ratio 3:2 represents **5 parts** (add **3 + 2**)

Divide 30 students by the 5 parts (divide)

$$30 \div 5 = 6$$

Multiply the relevant part of the ratio by the answer (multiply)

$$3 \times 6 = 18 \text{ boys}$$



Adding and Subtracting fractions using a common denominator. (level 6)

True or false

False

$$\frac{1}{3} + \frac{1}{2} = \frac{2}{5}$$

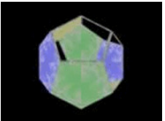
You cannot just add the numerators and the denominators

Using Equivalent Fractions

$$\frac{1}{3} + \frac{1}{2} = \frac{2}{6} + \frac{3}{6} = \frac{5}{6}$$

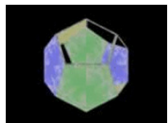
A common multiple of 3 and 11 is 33, so change both fractions to equivalent fractions with a denominator of 33

$$\frac{2}{3} + \frac{2}{11} = \frac{22}{33} + \frac{6}{33}$$
$$= \frac{28}{33}$$

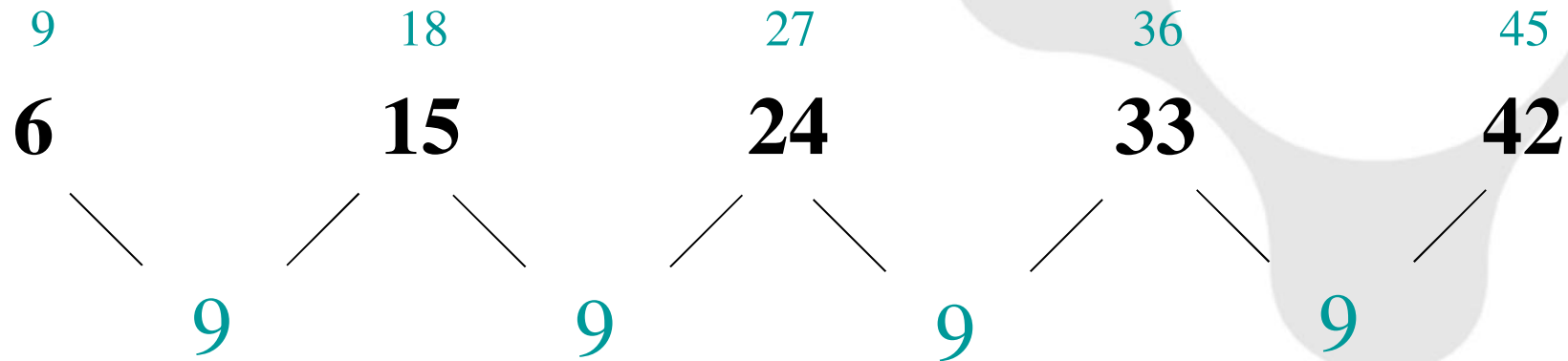


A common multiple of 3 and 4 is 12, so change both fractions to equivalent fractions with a denominator of 12

$$\frac{2}{3} - \frac{1}{4} = \frac{8}{12} - \frac{3}{12}$$
$$= \frac{5}{12}$$

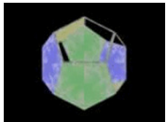


Find the **nth term** of this sequence



Which times table is this pattern based on? 9

How does it compare to the 9 times table? Each number is 3 less



$$\text{nth term} = 9n - 3$$

Equations

Solve

$$2a + 6 = 26$$

- 6



- 6

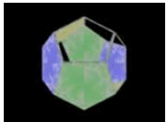
$$2a = 20$$

÷ 2



÷ 2

$$a = 10$$



Equations

Solve

$$4p - 7 = p + 26$$

-p

-p

$$3p - 7 = 26$$

+7

+7

then

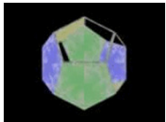
then

÷ 3

÷ 3

$$3p = 33$$

$$p = 11$$



$$4p + 5 = 75 - 3p$$

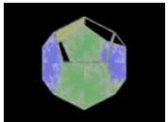
Swap Sides, Swap Signs

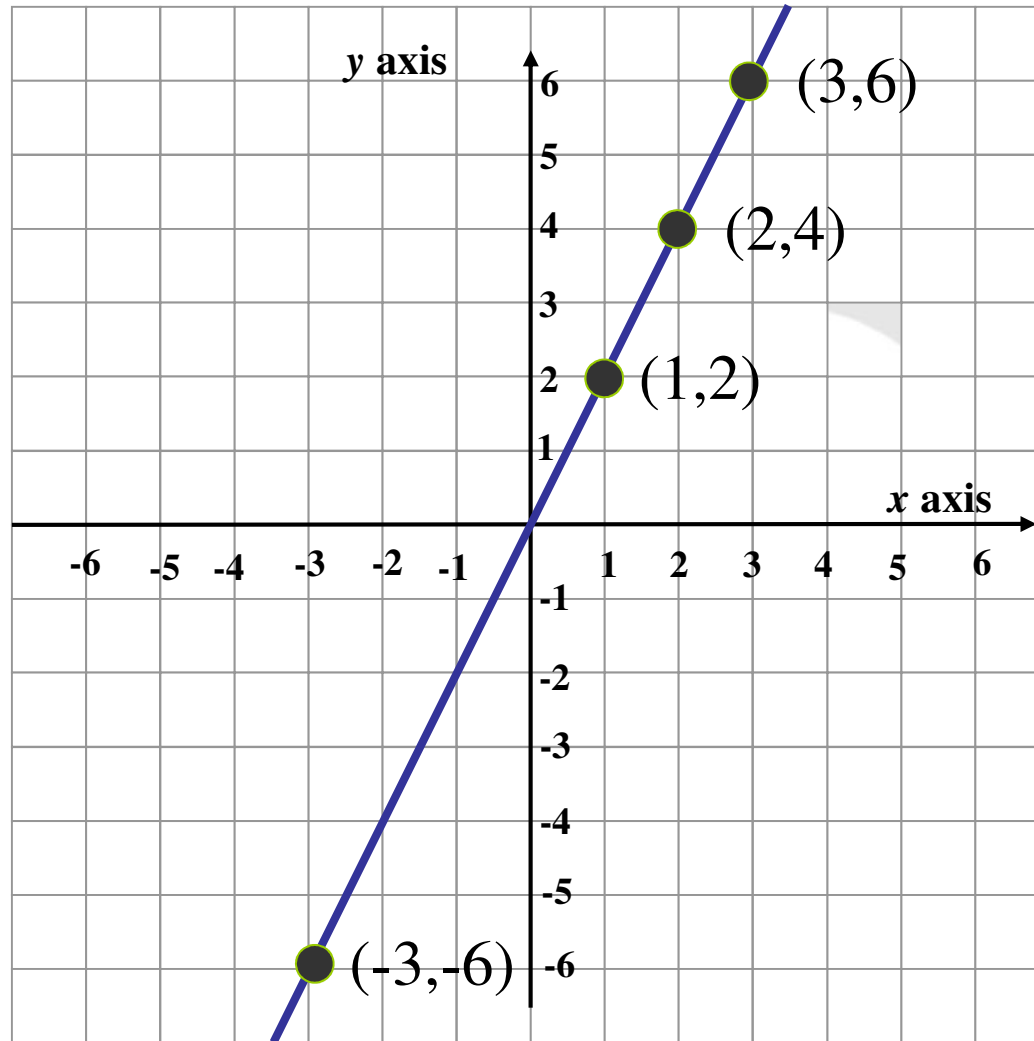
$$4p + 5 = 75 - 3p$$

$$4p + 3p = 75 - 5$$

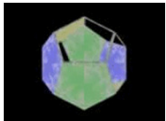
$$7p = 70$$

$$p = 10$$



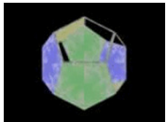
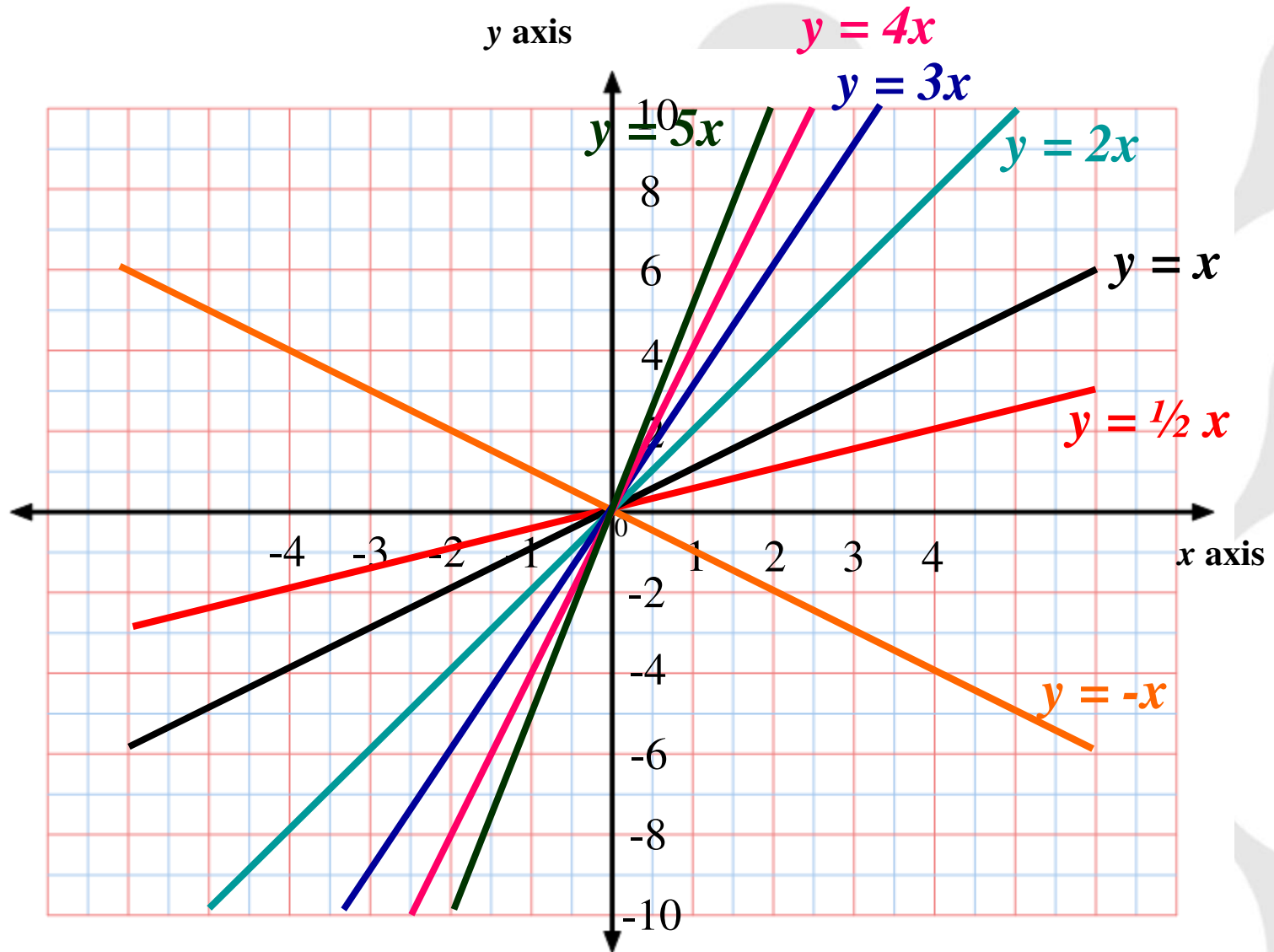


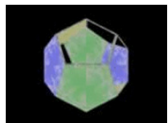
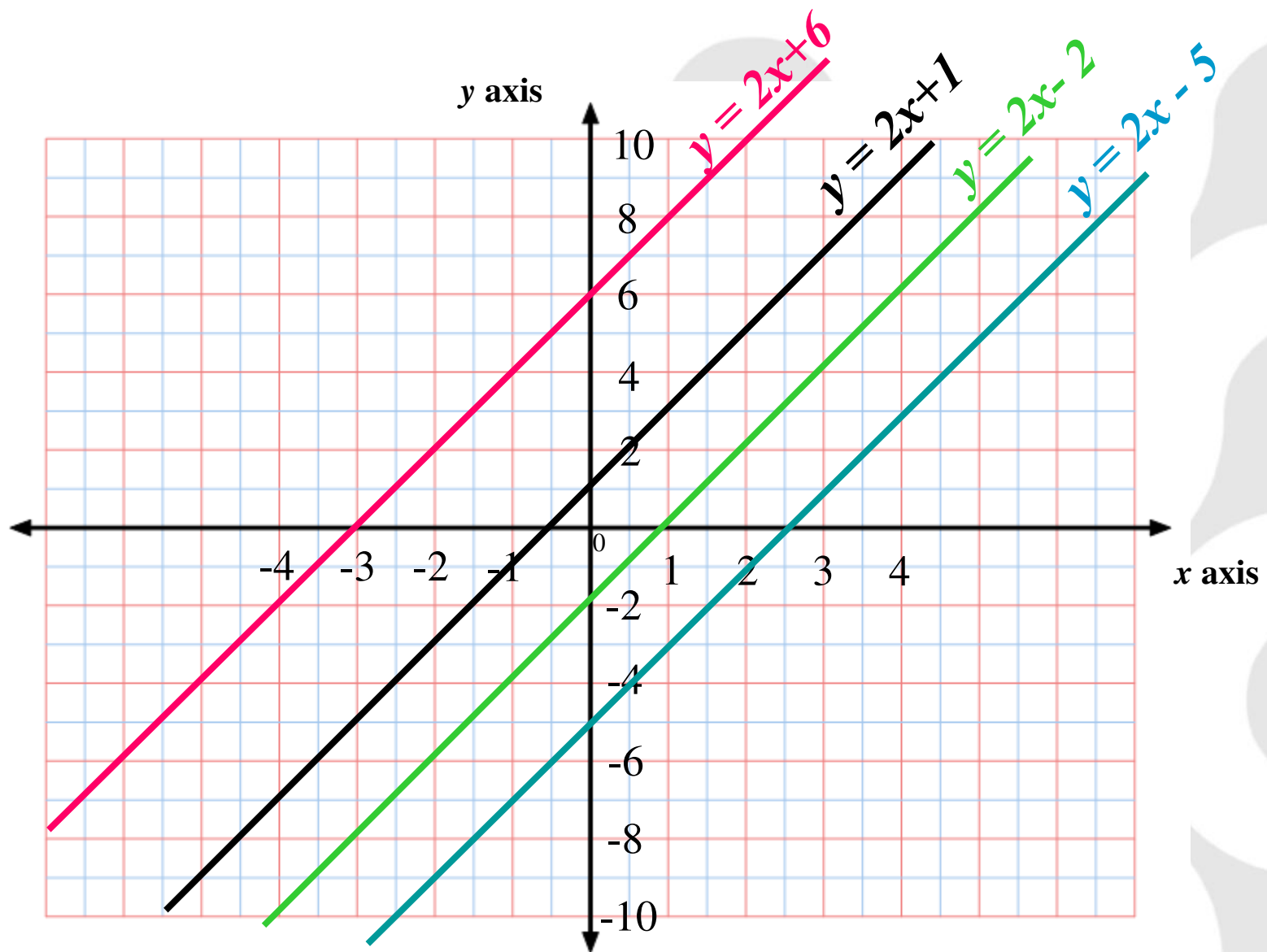
The y coordinate is always double the x coordinate



$$y = 2x$$

Straight Line Graphs





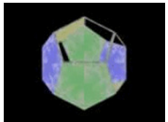
All straight line graphs can be expressed in the form

$$y = mx + c$$

m is the **gradient** of the line

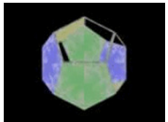
and **c** is the **y intercept**

The graph $y = 5x + 4$ has gradient **5** and cuts the y axis at **4**

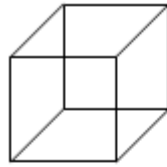


Level 6

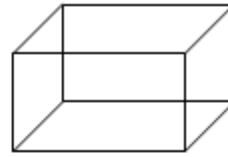
Shape, Space and Measures



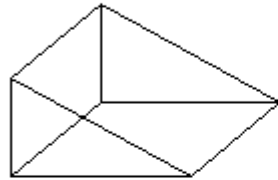
Cube



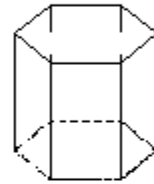
Cuboid



Triangular
Prism



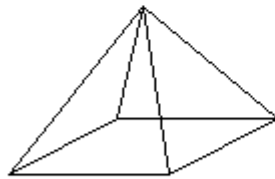
Hexagonal Prism



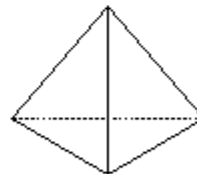
Cylinder



Square
based
Pyramid



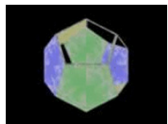
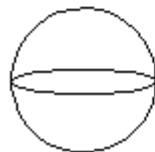
Tetrahedron



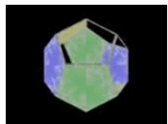
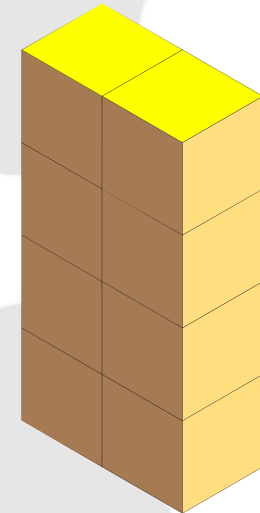
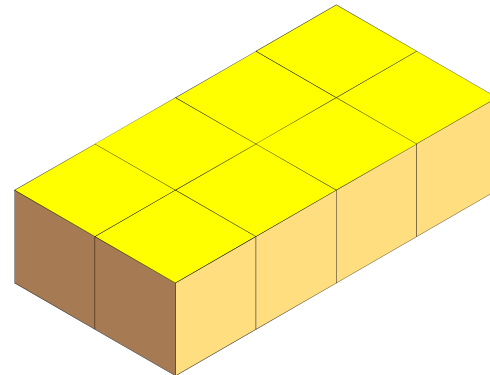
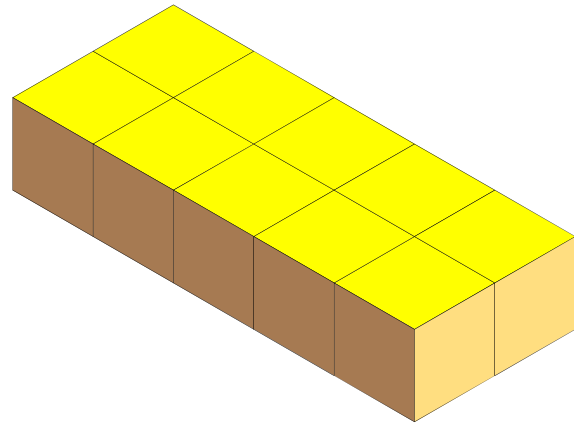
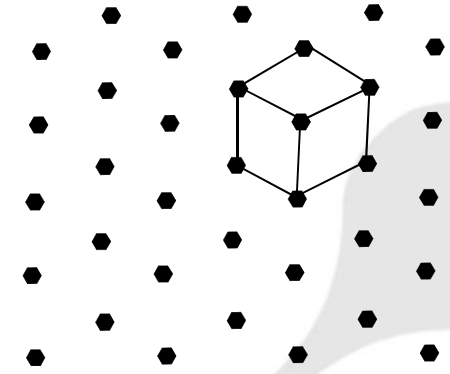
Cone



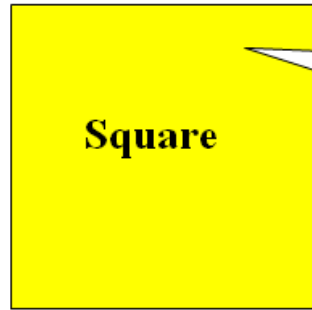
Sphere



Using Isometric Paper



Which Cuboid is the odd one out?



Square

All 4 sides are equal lengths. All angles are 90°



Rectangle

Opposite sides are equal lengths. All angles are 90°



Rhombus

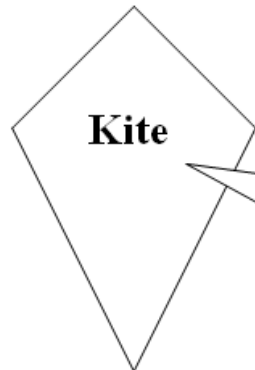
All 4 sides are equal lengths.



Parallelograms

Two pairs of parallel sides. Opposite sides are equal.

Quadrilaterals



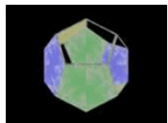
Kite

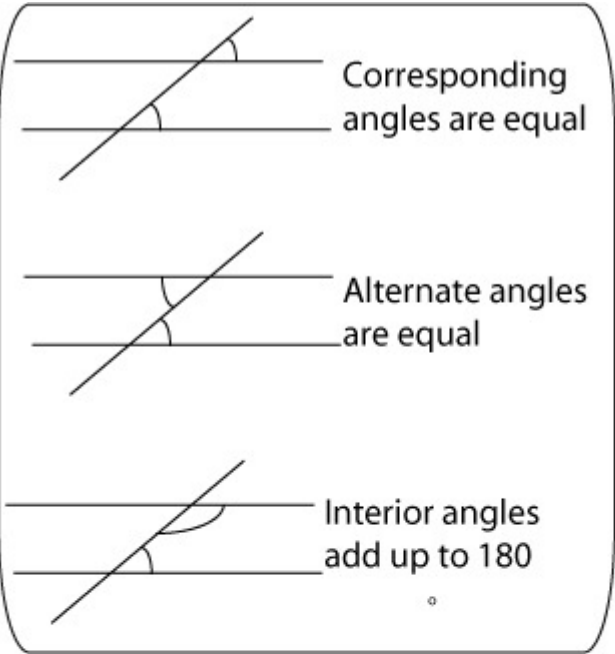
2 pairs of adjacent sides are equal. One pair of opposite angles are equal



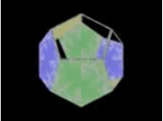
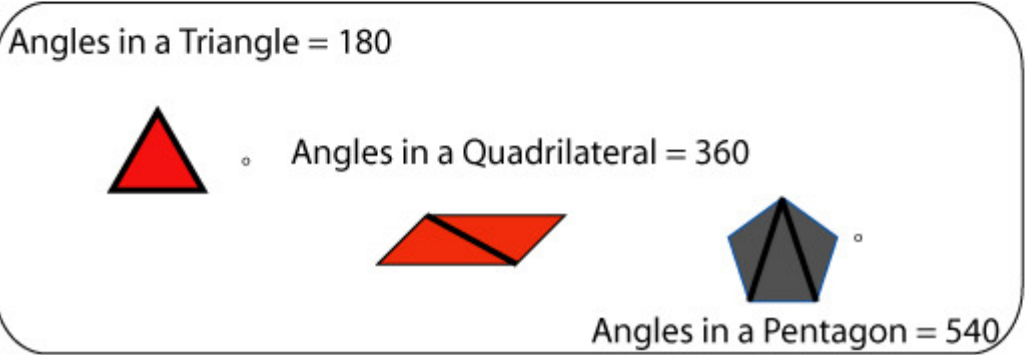
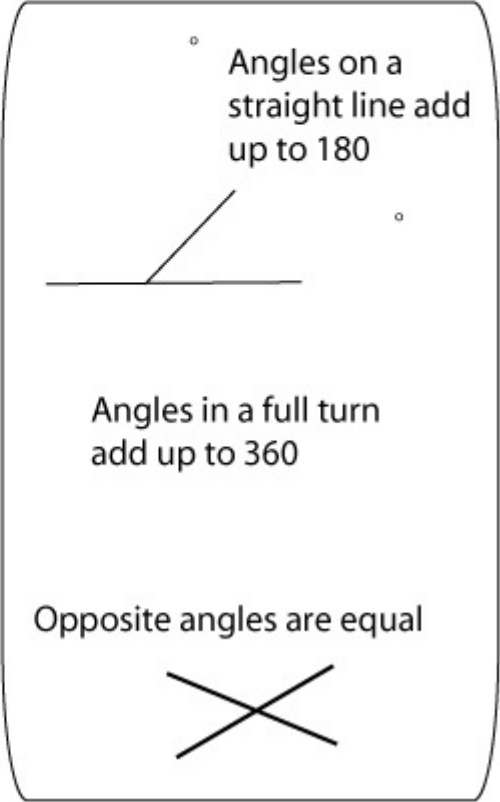
Trapezium

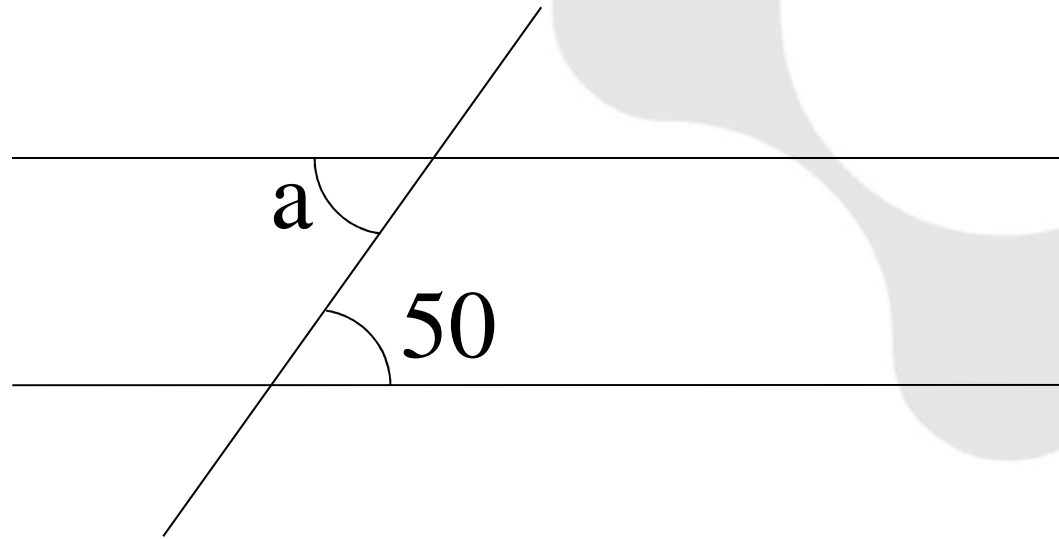
One pair of parallel sides





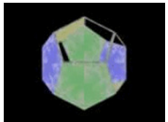
Angles

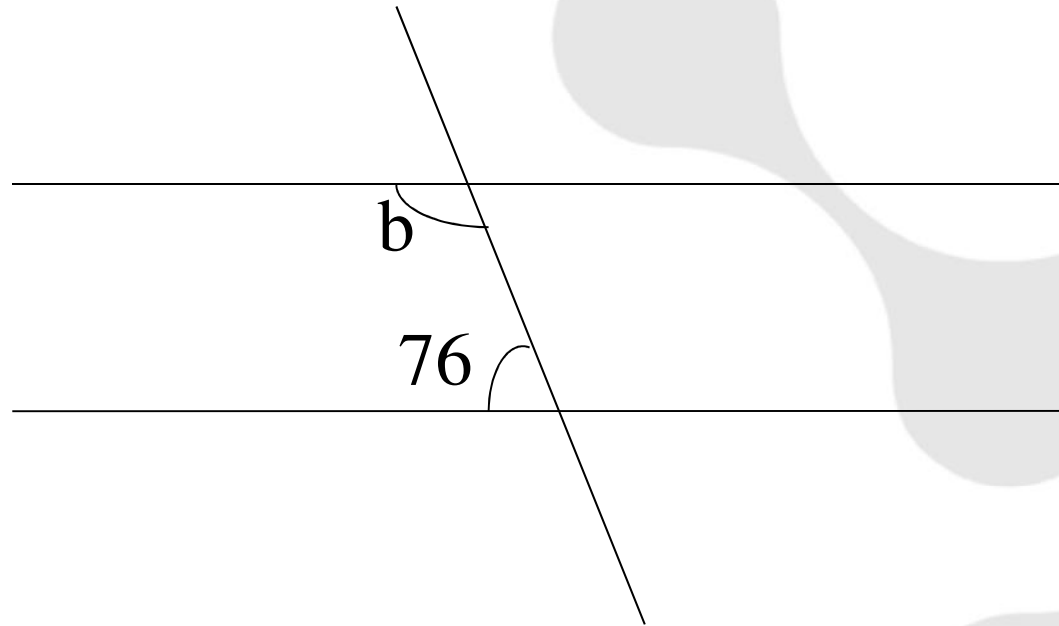




Alternate angles are equal

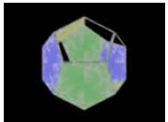
$$a = 50$$

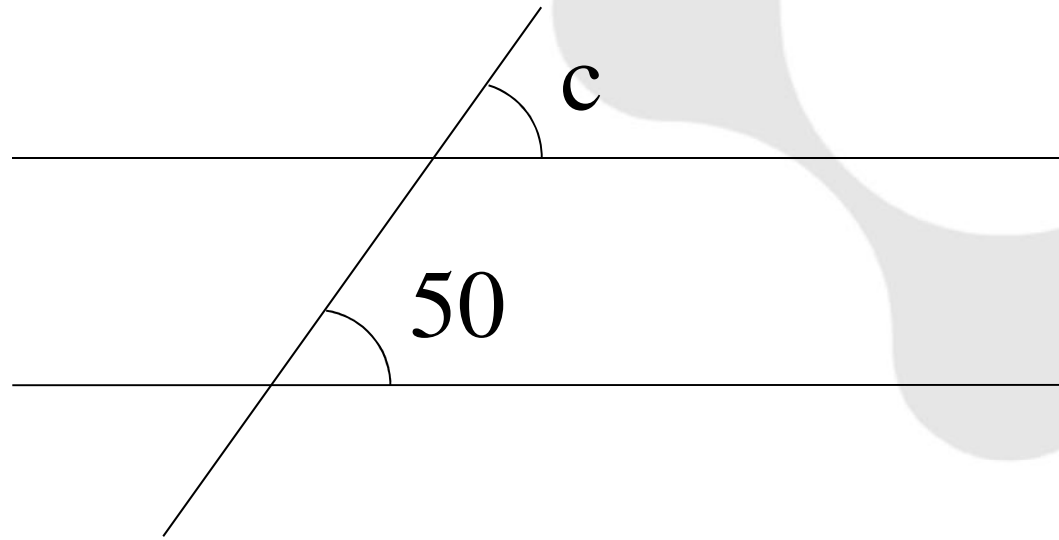




Interior angles add up to 180

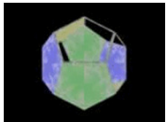
$$b = 180 - 76 = 104$$

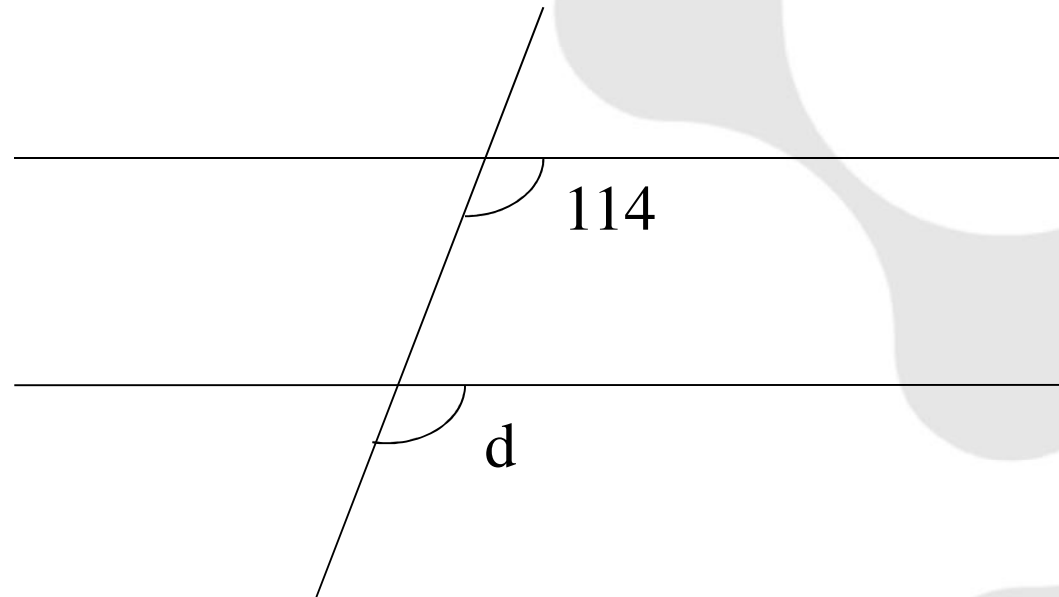




Corresponding angles are equal

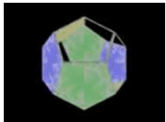
$$c = 50$$

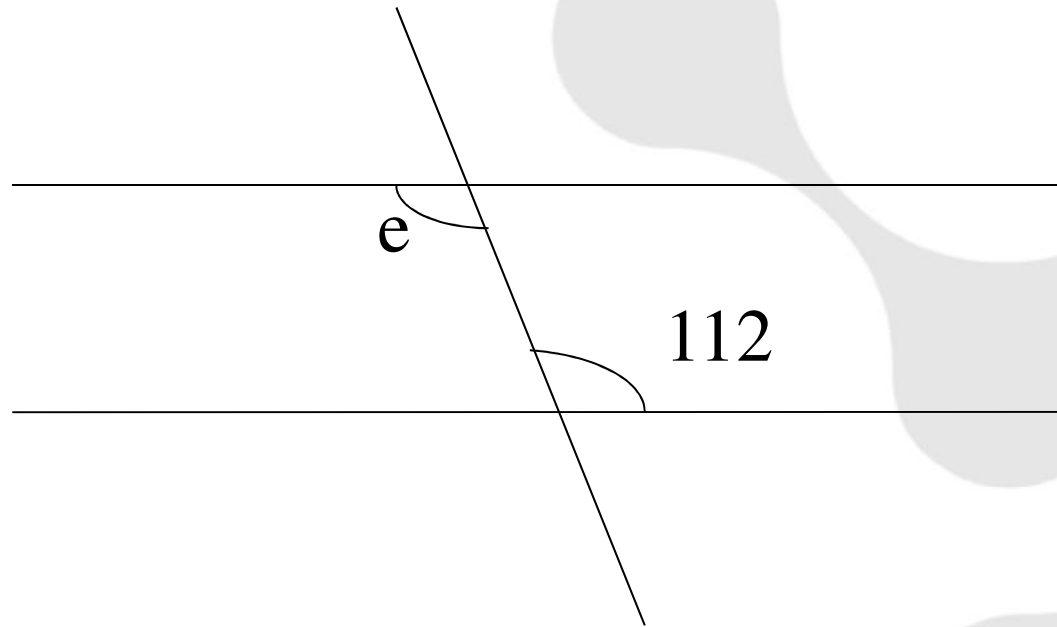




Corresponding angles are equal

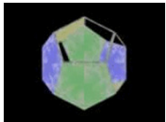
$$d = 114$$

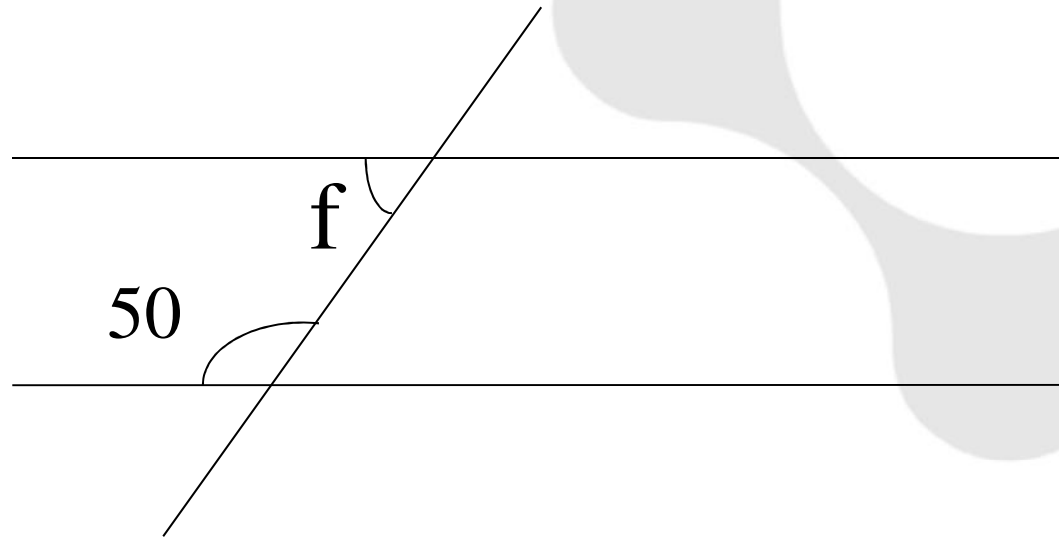




Alternate angles are equal

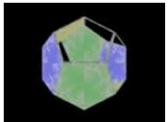
$$e = 112$$





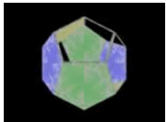
Interior angles add up to 180

$$f = 130$$



The Sum of the Interior Angles

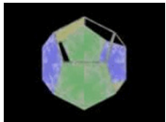
Polygon	Sides (n)	Sum of Interior Angles
Triangle	3	180
Quadrilateral	4	
Pentagon	5	
Hexagon	6	
Heptagon	7	
Octagon	8	



What is the rule that links the **Sum of the Interior Angles** to n ?

The Sum of the Interior Angles

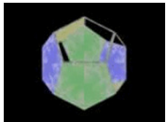
Polygon	Sides (n)	Sum of Interior Angles
Triangle	3	180
Quadrilateral	4	360
Pentagon	5	
Hexagon	6	
Heptagon	7	
Octagon	8	



What is the rule that links the **Sum of the Interior Angles** to n ?

The Sum of the Interior Angles

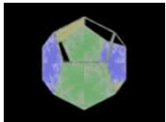
Polygon	Sides (n)	Sum of Interior Angles
Triangle	3	180
Quadrilateral	4	360
Pentagon	5	540
Hexagon	6	
Heptagon	7	
Octagon	8	



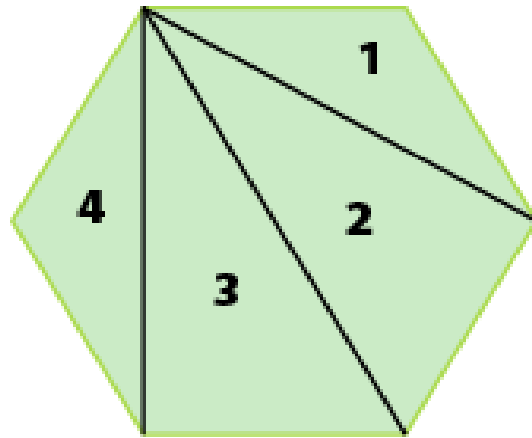
What is the rule that links the **Sum of the Interior Angles** to n ?

The Sum of the Interior Angles

Polygon	Sides (n)	Sum of Interior Angles
Triangle	3	180
Quadrilateral	4	360
Pentagon	5	540
Hexagon	6	720
Heptagon	7	
Octagon	8	



What is the rule that links the **Sum of the Interior Angles** to n ?

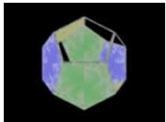


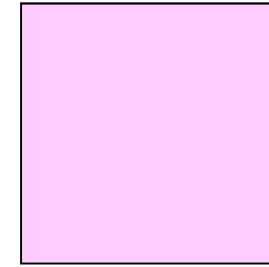
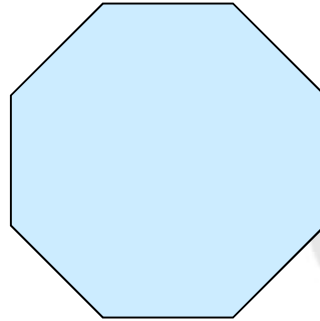
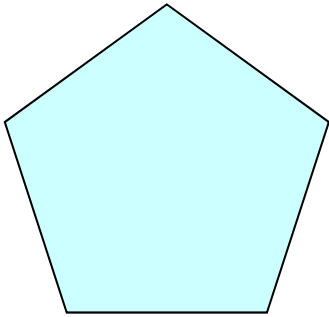
A hexagon can be split into 4 triangles

Sum of interior angles = 4 x 180 = **720**

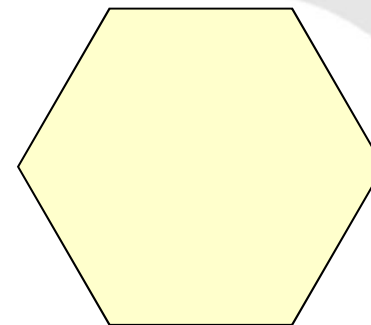
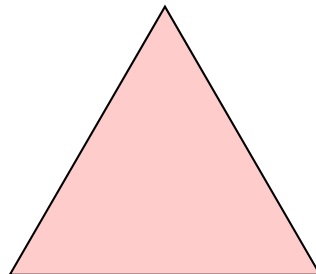
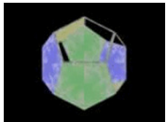
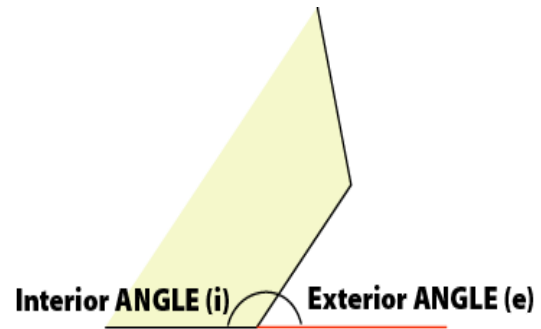
For a polygon with n sides

Sum of the Interior Angles = 180 (n - 2)





A regular polygon has equal sides and equal angles

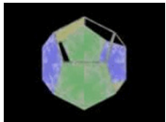


Regular Polygon	Interior Angle (i)	Exterior Angle (e)
Equilateral Triangle	60	120
Square		
Regular Pentagon		
Regular Hexagon		
Regular Heptagon		
Regular Octagon		

If n = number of sides

$$e = 360 \div n$$

$$e + i = 180$$

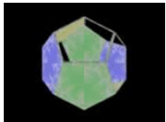


Regular Polygon	Interior Angle (i)	Exterior Angle (e)
Equilateral Triangle	60	120
Square	90	90
Regular Pentagon		
Regular Hexagon		
Regular Heptagon		
Regular Octagon		

If n = number of sides

$$e = 360 \div n$$

$$e + i = 180$$

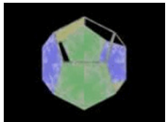


Regular Polygon	Interior Angle (i)	Exterior Angle (e)
Equilateral Triangle	60	120
Square	90	90
Regular Pentagon	108	72
Regular Hexagon		
Regular Heptagon		
Regular Octagon		

If n = number of sides

$$e = 360 \div n$$

$$e + i = 180$$

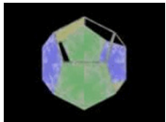


Regular Polygon	Interior Angle (i)	Exterior Angle (e)
Equilateral Triangle	60	120
Square	90	90
Regular Pentagon	108	72
Regular Hexagon	120	60
Regular Heptagon		
Regular Octagon		

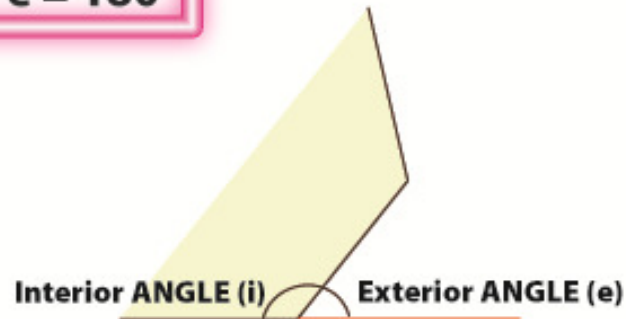
If n = number of sides

$$e = 360 \div n$$

$$e + i = 180$$



$$i + e = 180$$



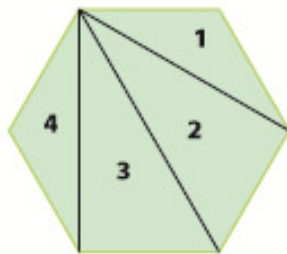
$$e = \frac{360}{n}$$

$$n = \frac{360}{e}$$

for regular polygons



Polygon Angles



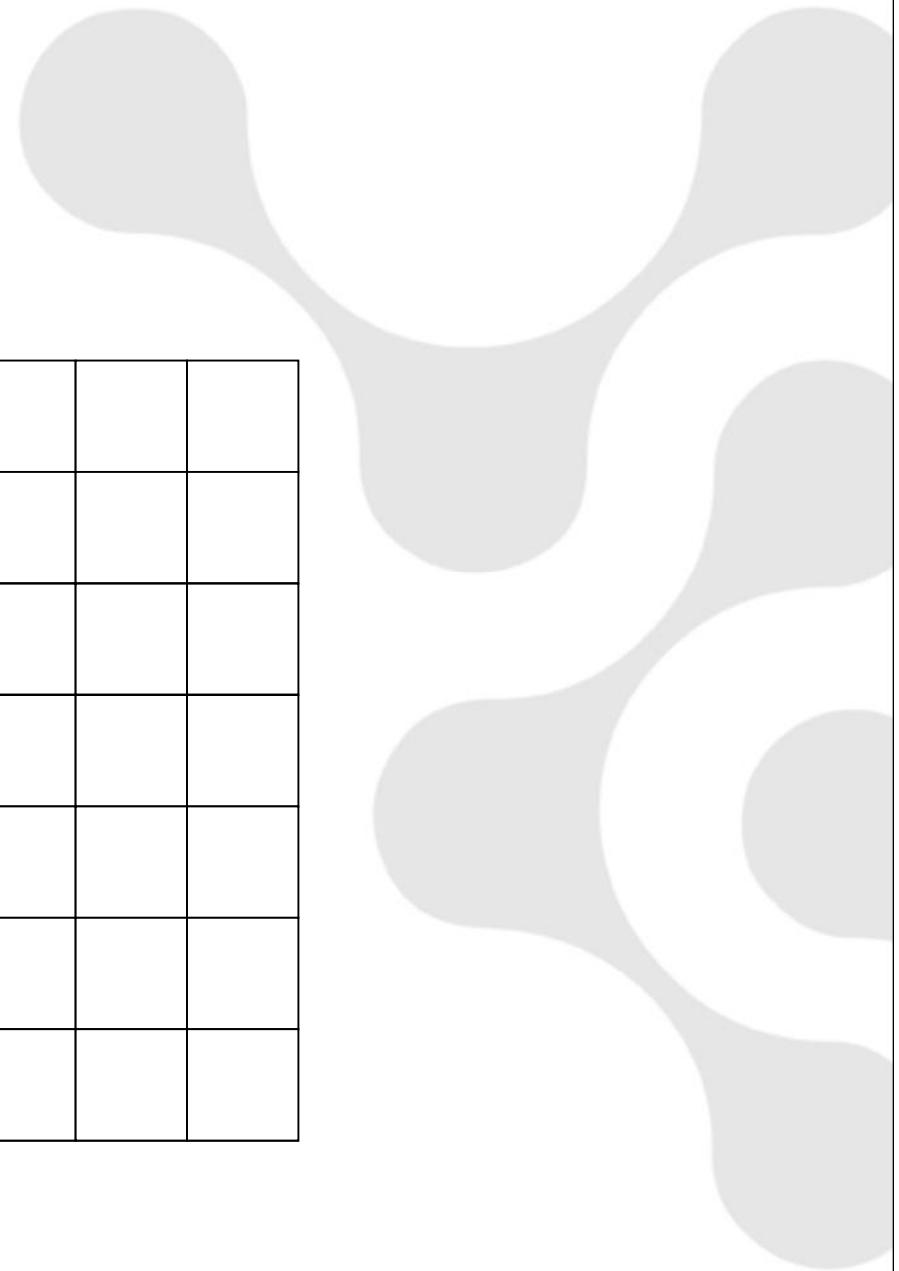
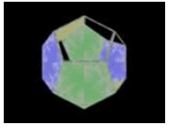
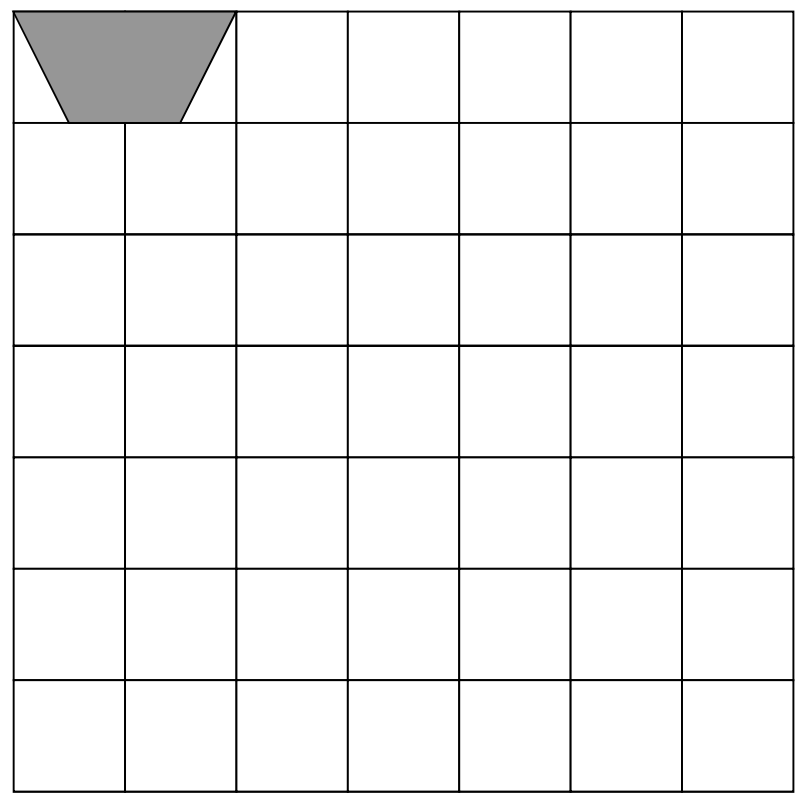
A hexagon can be split into 4 triangles

Sum of interior angles = $4 \times 180 = 720$

Polygon	Sides (n)	Sum of Interior Angles
Triangle	3	180
Quadrilateral	4	360
Pentagon	5	540
Hexagon	6	720
Heptagon	7	900
Octagon	8	1080

$$\text{Sum of interior angles} = 180(n - 2)$$

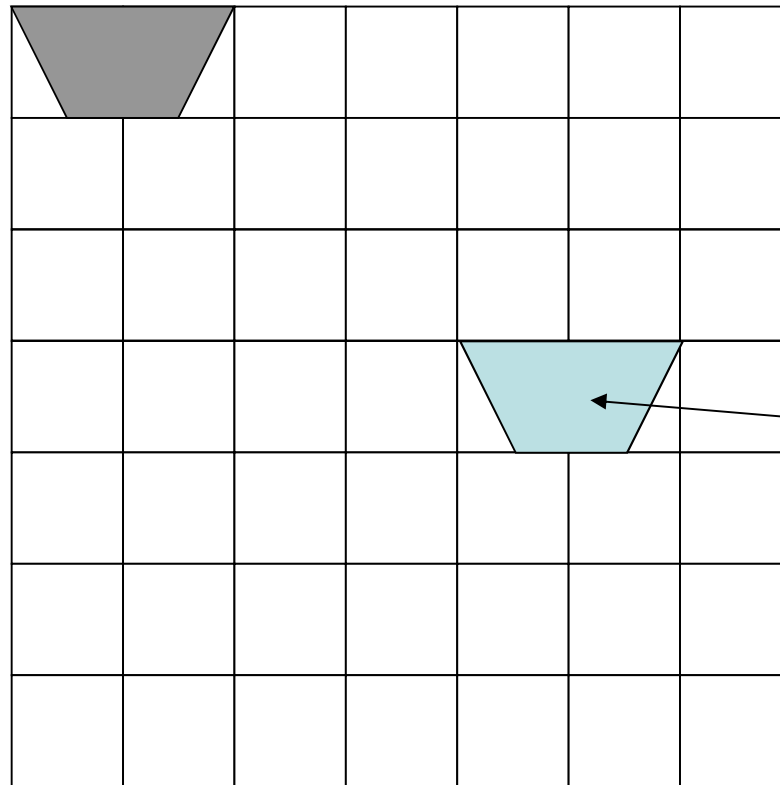
Translate the object by $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$



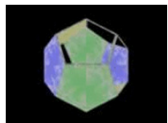
Translate the object by $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$



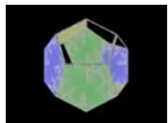
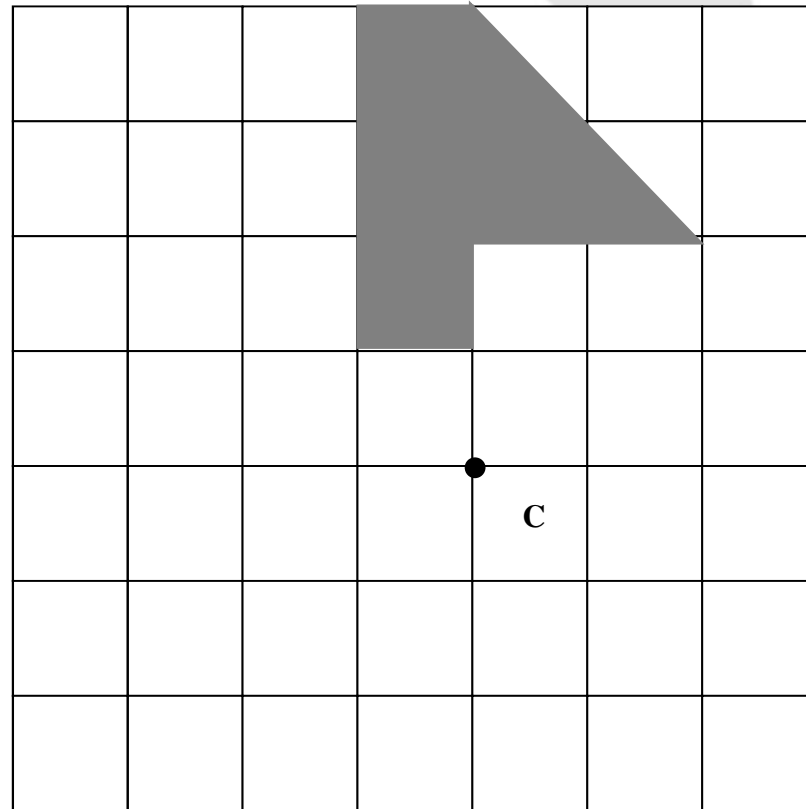
Move each corner of the object 4 squares across and 3 squares down



Image

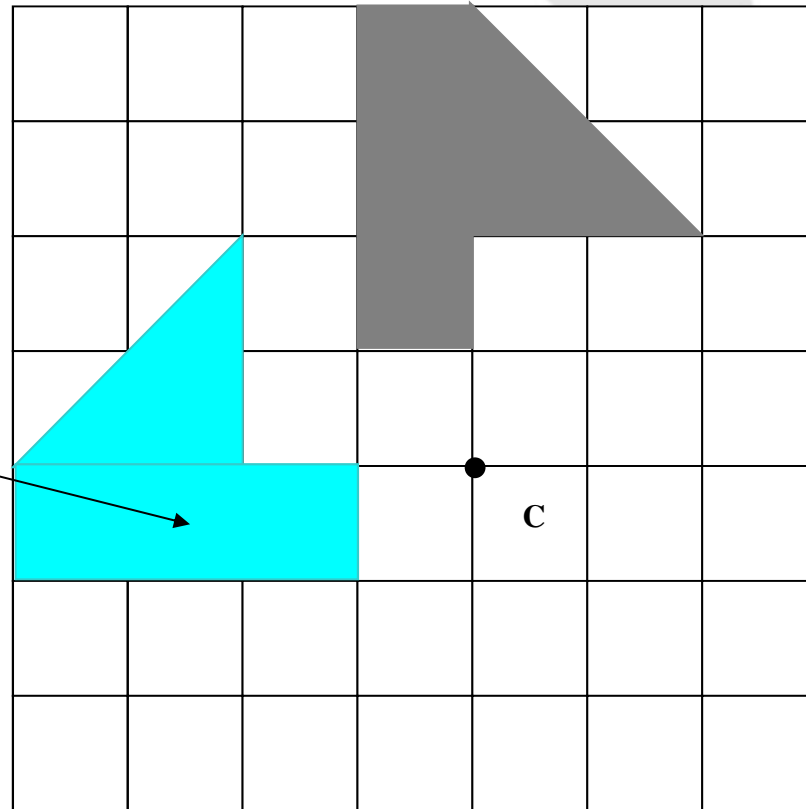


Rotate by 90 degrees anti-clockwise about c

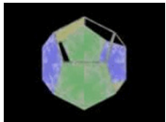


Rotate by 90 degrees anti-clockwise about C

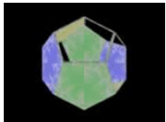
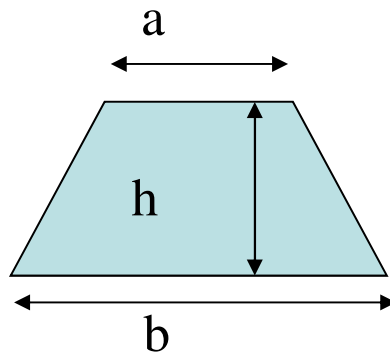
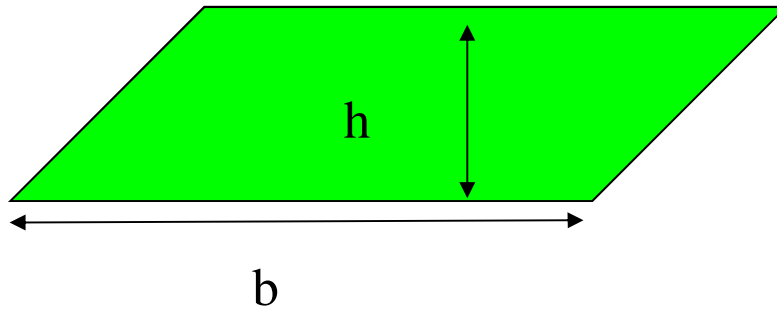
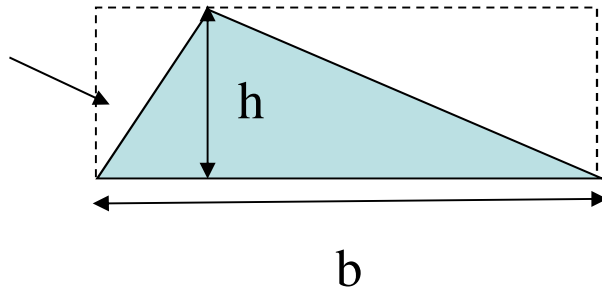
Image



Remember to ask for tracing paper



We divide by 2 because the area of the triangle is half that of the rectangle that surrounds it



Triangle

Area = base \times height \div 2

$$A = bh/2$$

Parallelogram

Area = base \times height

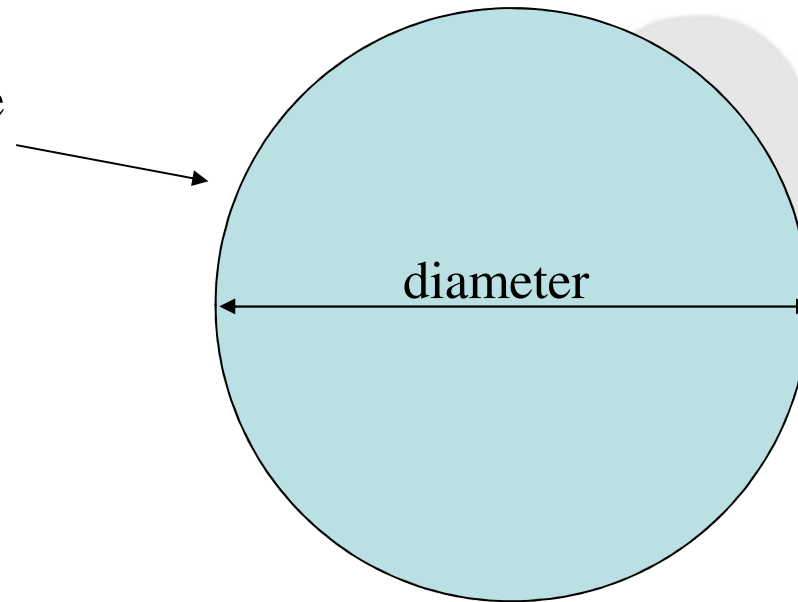
$$A = bh$$

Trapezium

$$A = \frac{1}{2} h(a + b)$$

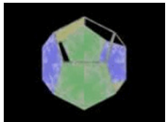
The formula for the trapezium is given in the front of the SATs paper

The circumference of a circle is the distance around the outside



$$\text{Circumference} = \pi \times \text{diameter}$$

Where $\pi = 3.14$ (rounded to 2 decimal places)



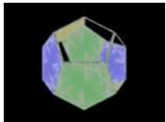
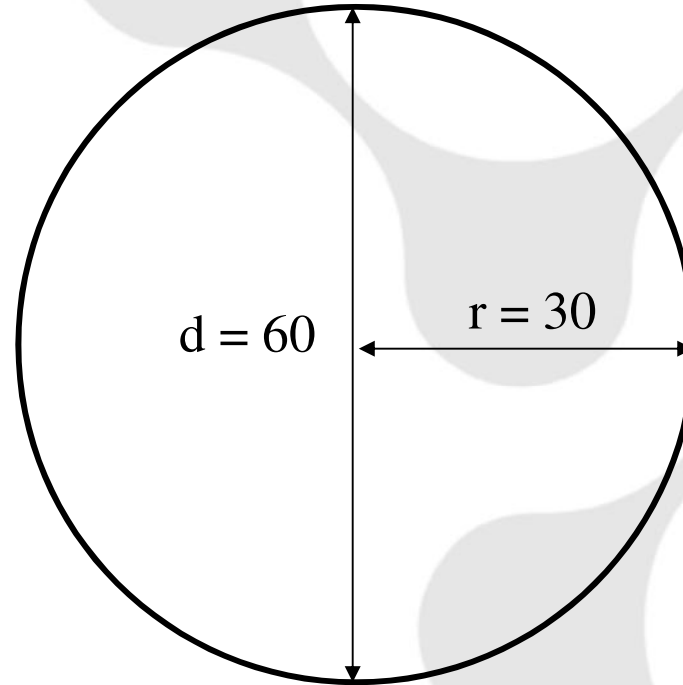
**The radius of a circle is
30m. What is the
circumference?**

$$r=30, d=60$$

$$C = \pi d$$

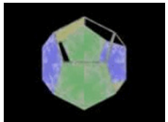
$$C = 3.14 \times 60$$

$$C = 18.84 \text{ m}$$



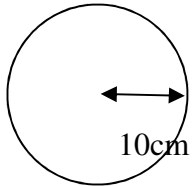


Circle Area = πr^2



$$\pi = 3.141592653589793238462643$$

Circumference = $\pi \times 20$
= 3.142×20
= 62.84 cm



Need radius = distance from the centre of a circle to the edge

Circumference

Area

$$\pi d$$

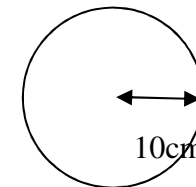
Circle Rules

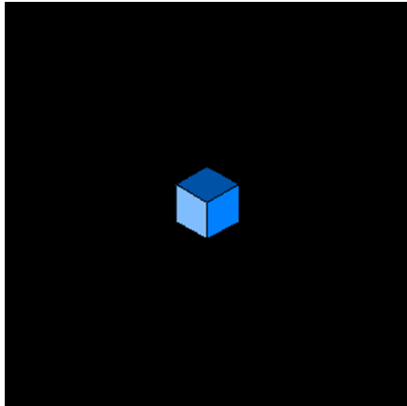
$$\pi r^2$$

The distance around the outside of a circle

Need diameter = distance across the middle of a circle

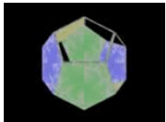
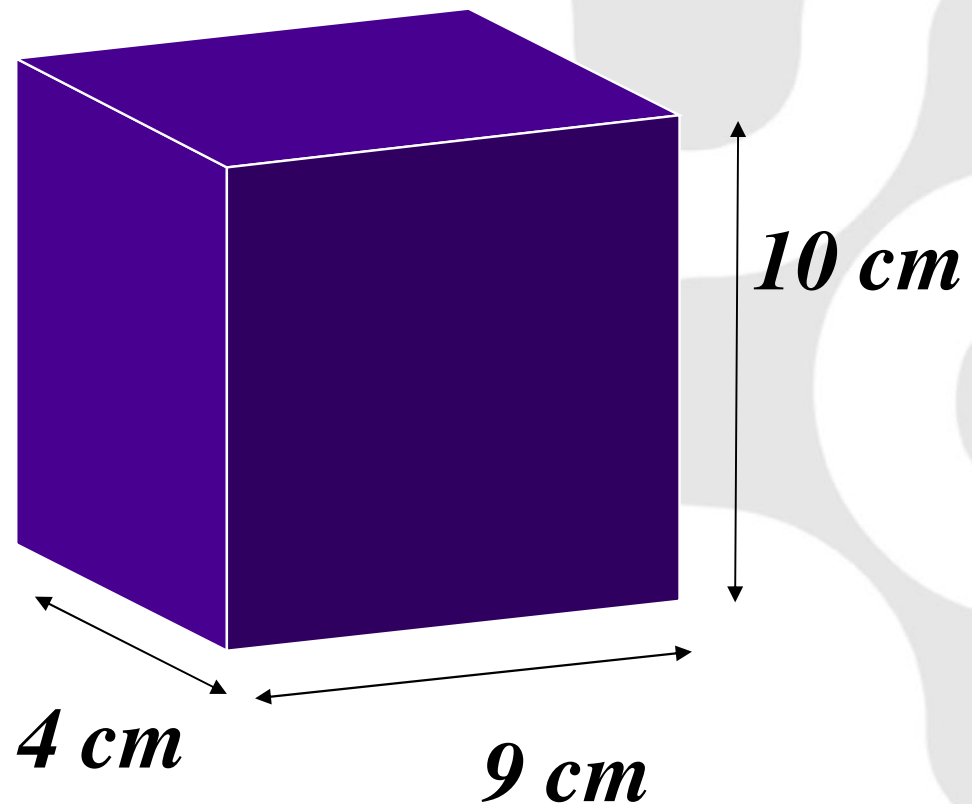
Area = $\pi \times 100$
= 3.142×100
= 314.2 cm²

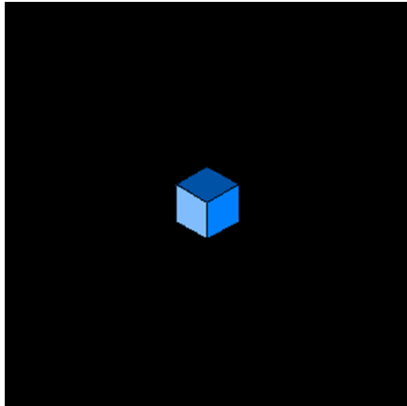




Volume of a cuboid

$$V = \text{length} \times \text{width} \times \text{height}$$

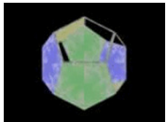
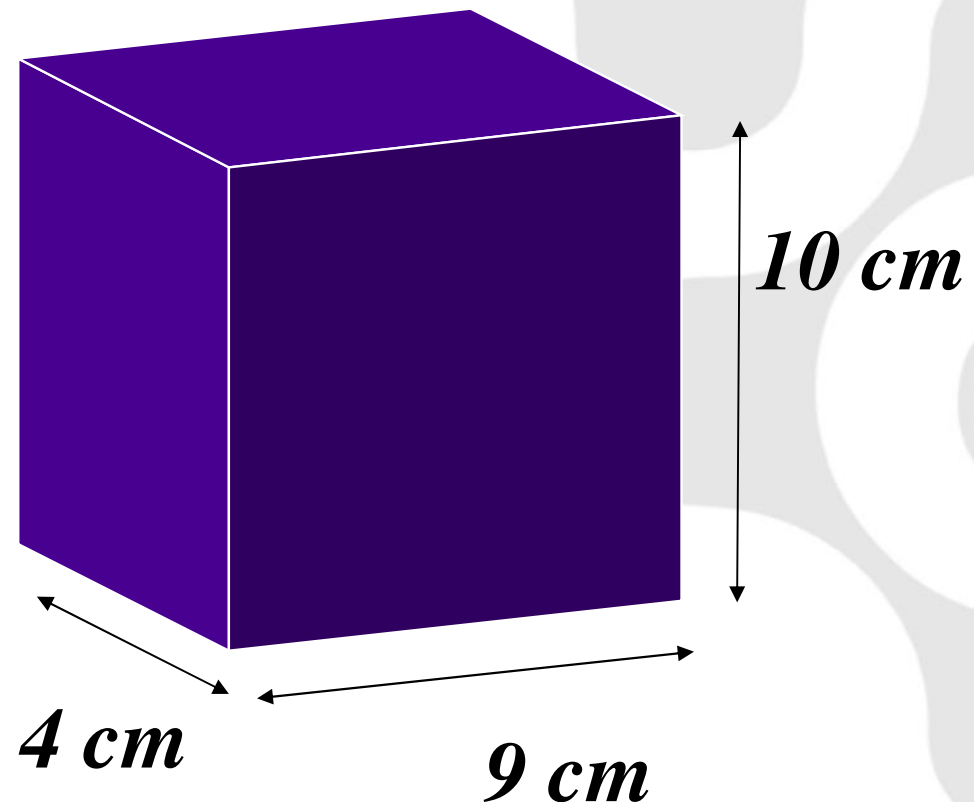




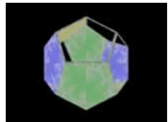
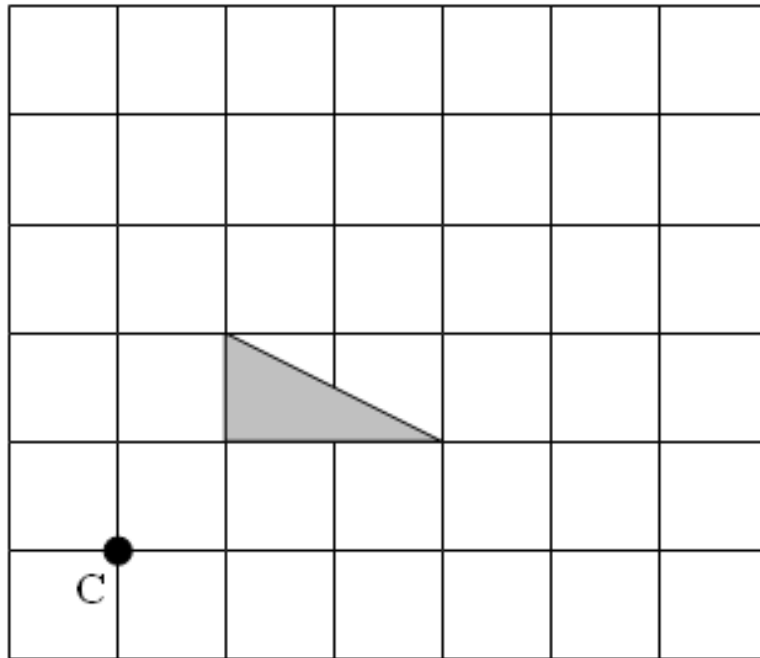
Volume of a cuboid

$$V = \text{length} \times \text{width} \times \text{height}$$

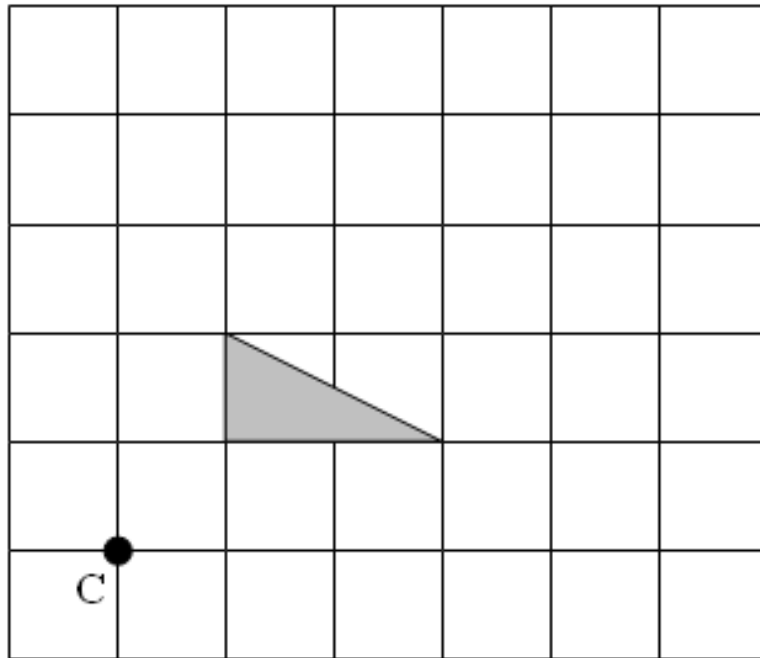
$$\begin{aligned} V &= 9 \times 4 \times 10 \\ &= 360 \text{ cm}^3 \end{aligned}$$



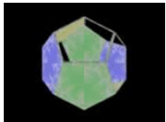
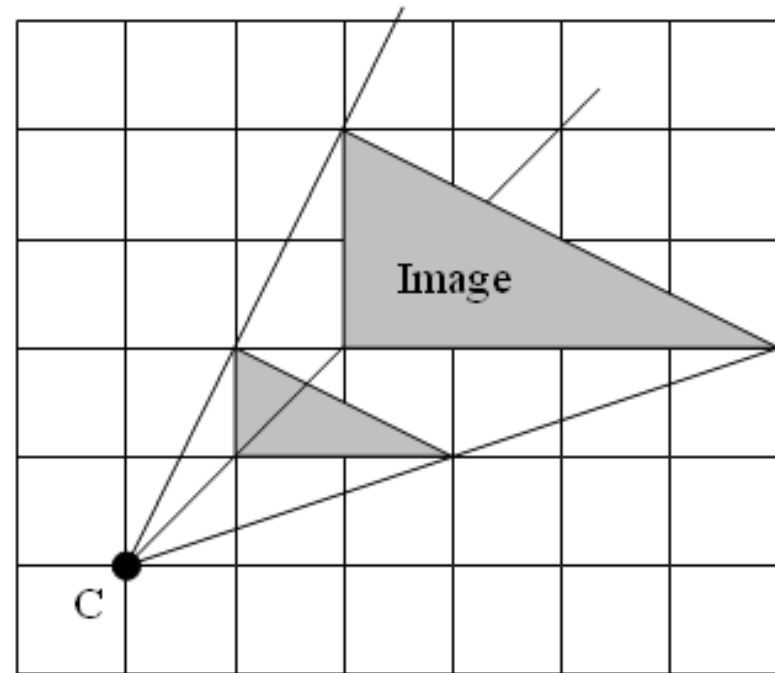
Enlarge the triangle by scale factor 2
using the centre of enlargement (C)



Enlarge the triangle by scale factor 2
using the centre of enlargement (C)

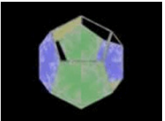


ANSWER



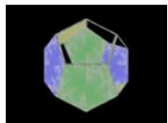
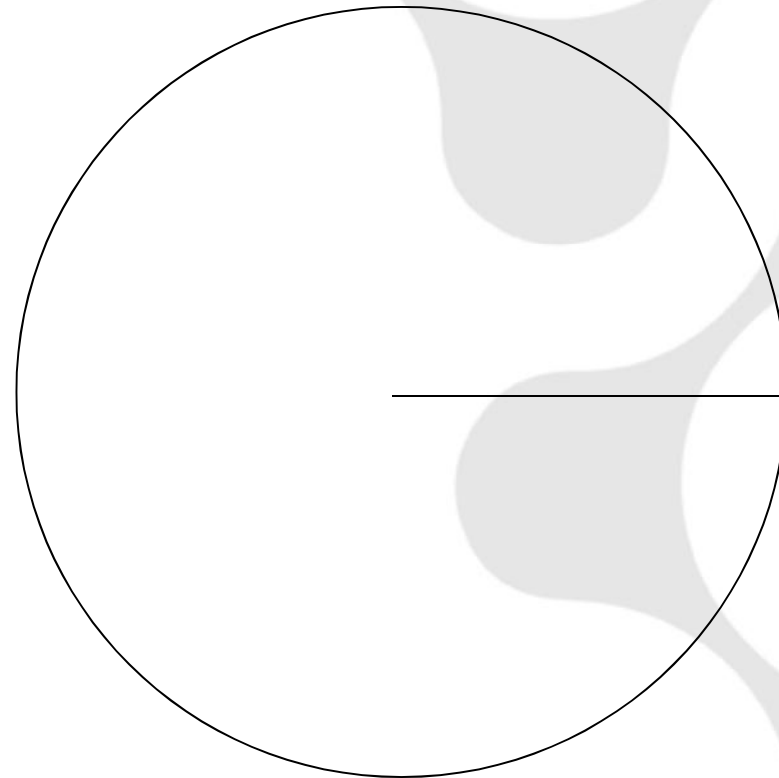
Level 6

Data Handling



Draw a Pie Chart to show the information in the table below

Colour	Frequency
Blue	5
Green	3
Yellow	2
Purple	2
Pink	4
Orange	1
Red	3

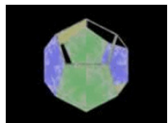
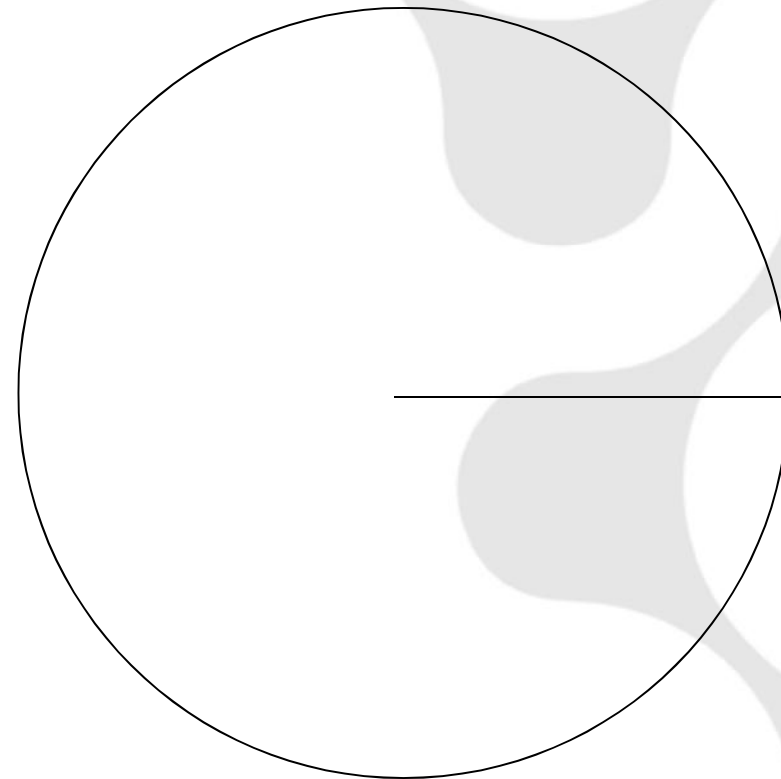


A pie chart to show the favourite colour in our class

Draw a Pie Chart to show the information in the table below

Colour	Frequency
Blue	5
Green	3
Yellow	2
Purple	2
Pink	4
Orange	1
Red	3
TOTAL	20

Add the frequencies to find the total



A pie chart to show the favourite colour in our class

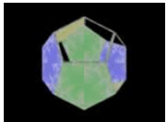
Draw a Pie Chart to show the information in the table below

Colour	Frequency
Blue	5
Green	3
Yellow	2
Purple	2
Pink	4
Orange	1
Red	3
TOTAL	20

Add the frequencies to find the total

DIVIDE 360° by the total to find the angle for 1 person

$$360 \div 20 = 18$$



A pie chart to show the favourite colour in our class

Draw a Pie Chart to show the information in the table below

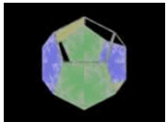
Colour	Frequency	Angle
Blue	5	$5 \times 18 = 90$
Green	3	$3 \times 18 = 54$
Yellow	2	$2 \times 18 = 36$
Purple	2	$2 \times 18 = 36$
Pink	4	$4 \times 18 = 72$
Orange	1	$1 \times 18 = 18$
Red	3	$3 \times 18 = 54$
TOTAL	20	

Multiply each frequency by the angle for 1 person

DIVIDE 360° by the total to find the angle for 1 person

$$360 \div 20 = 18$$

Add the frequencies to find the total

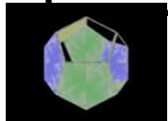
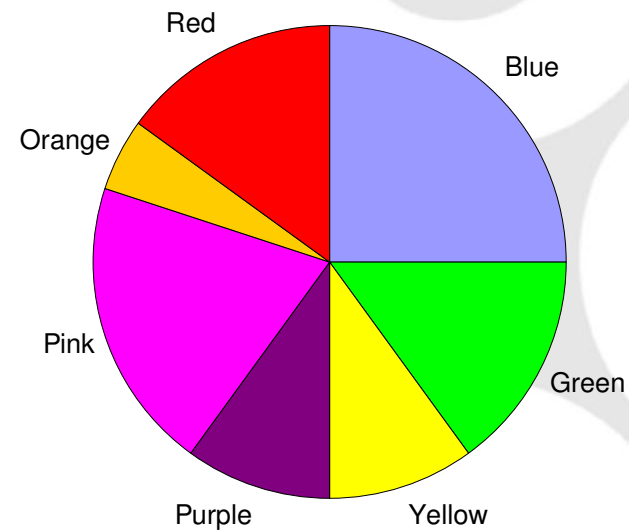


A pie chart to show the favourite colour in our class

Draw a Pie Chart to show the information in the table below

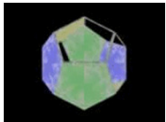
Colour	Frequency	Angle
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Purple	2	$2 \times 18 = 36$
Pink	4	$4 \times 18 = 72$
Orange	1	$1 \times 18 = 18$
Red	3	$3 \times 18 = 54$
TOTAL	20	

A bar chart to show the favourite colour in our class



Draw a **frequency polygon** to show the information in the table

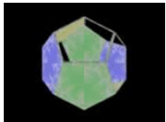
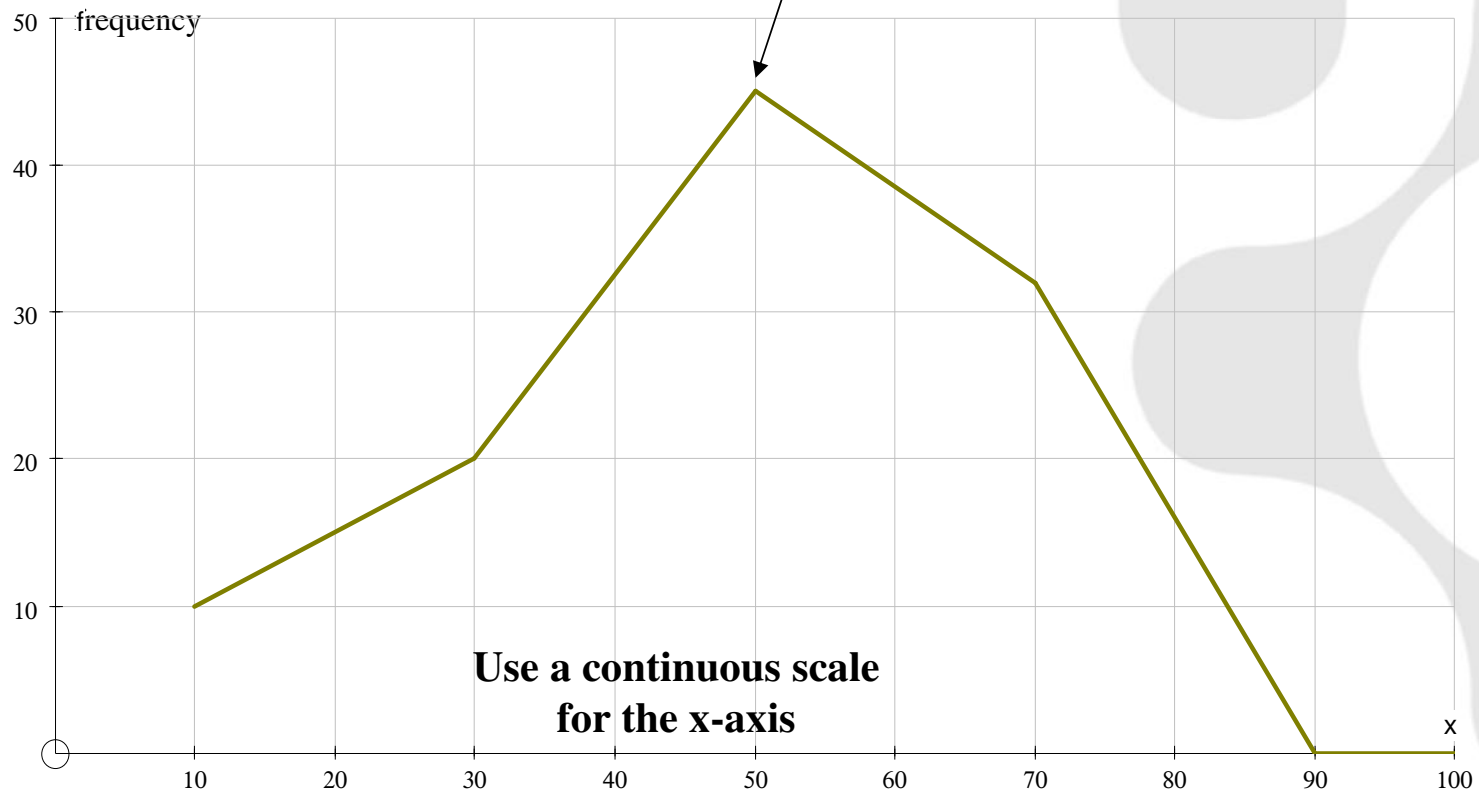
Length of string	Frequency
$0 < x \leq 20$	10
$20 < x \leq 40$	20
$40 < x \leq 60$	45
$60 < x \leq 80$	32
$80 < x \leq 100$	0



Draw a **frequency polygon** to show the information in the table

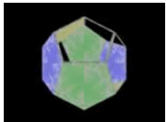
Length of string (x)	Frequency
$0 < x \leq 20$	10
$20 < x \leq 40$	20
$40 < x \leq 60$	45
$60 < x \leq 80$	32
$80 < x \leq 100$	0

Plot the point using the midpoint of the interval



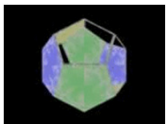
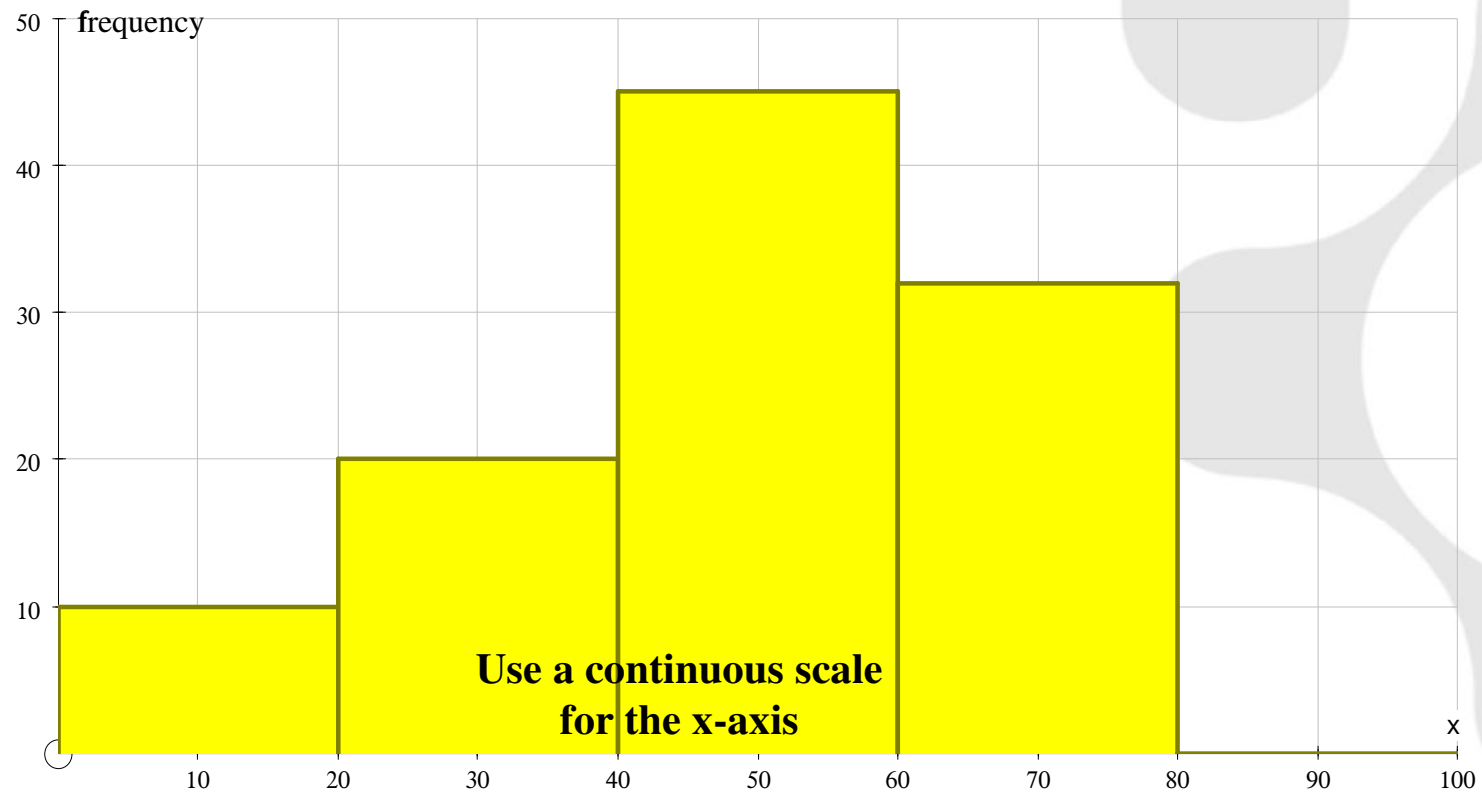
Draw a **histogram** to show
the information in the table

Length of string	Frequency
$0 < x \leq 20$	10
$20 < x \leq 40$	20
$40 < x \leq 60$	45
$60 < x \leq 80$	32
$80 < x \leq 100$	0



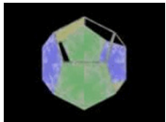
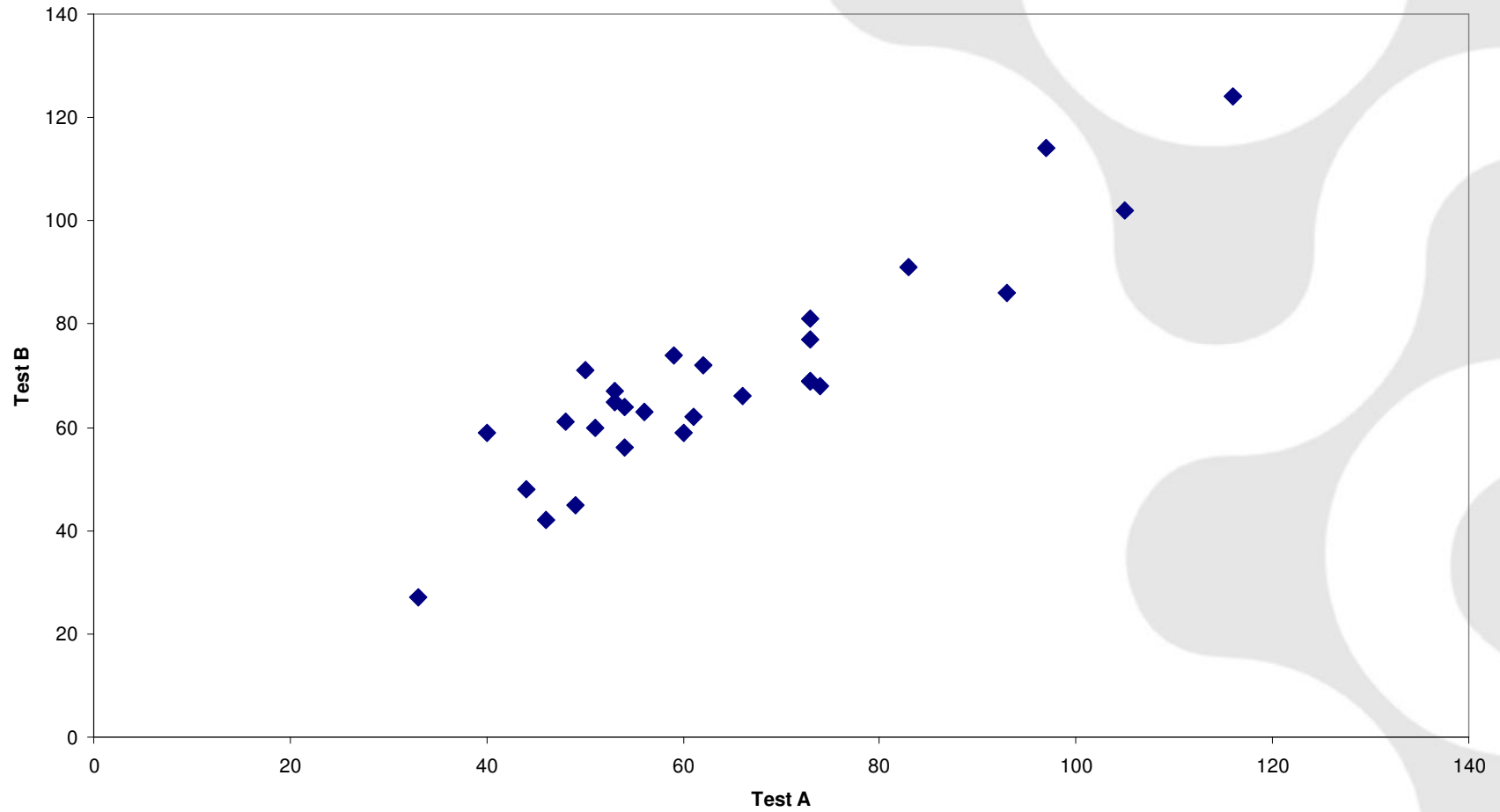
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Length of string (x)	Frequency
$0 < x \leq 20$	10
$20 < x \leq 40$	20
$40 < x \leq 60$	45
$60 < x \leq 80$	32
$80 < x \leq 100$	0



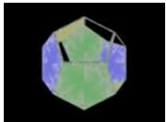
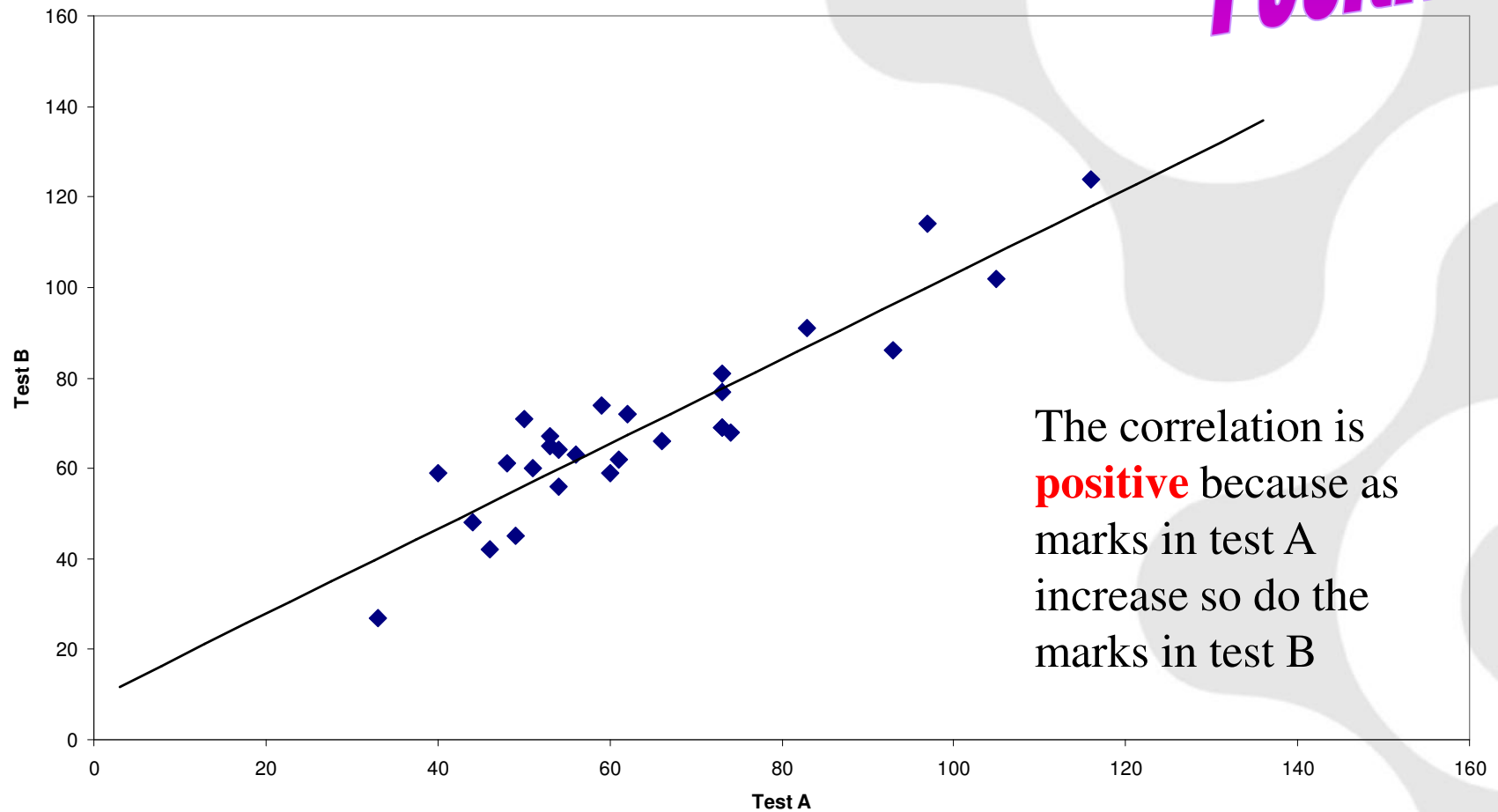
Describe the correlation between the marks scored in test A and test B

A Scatter Diagram to compare the marks of students in 2 maths tests



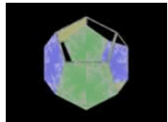
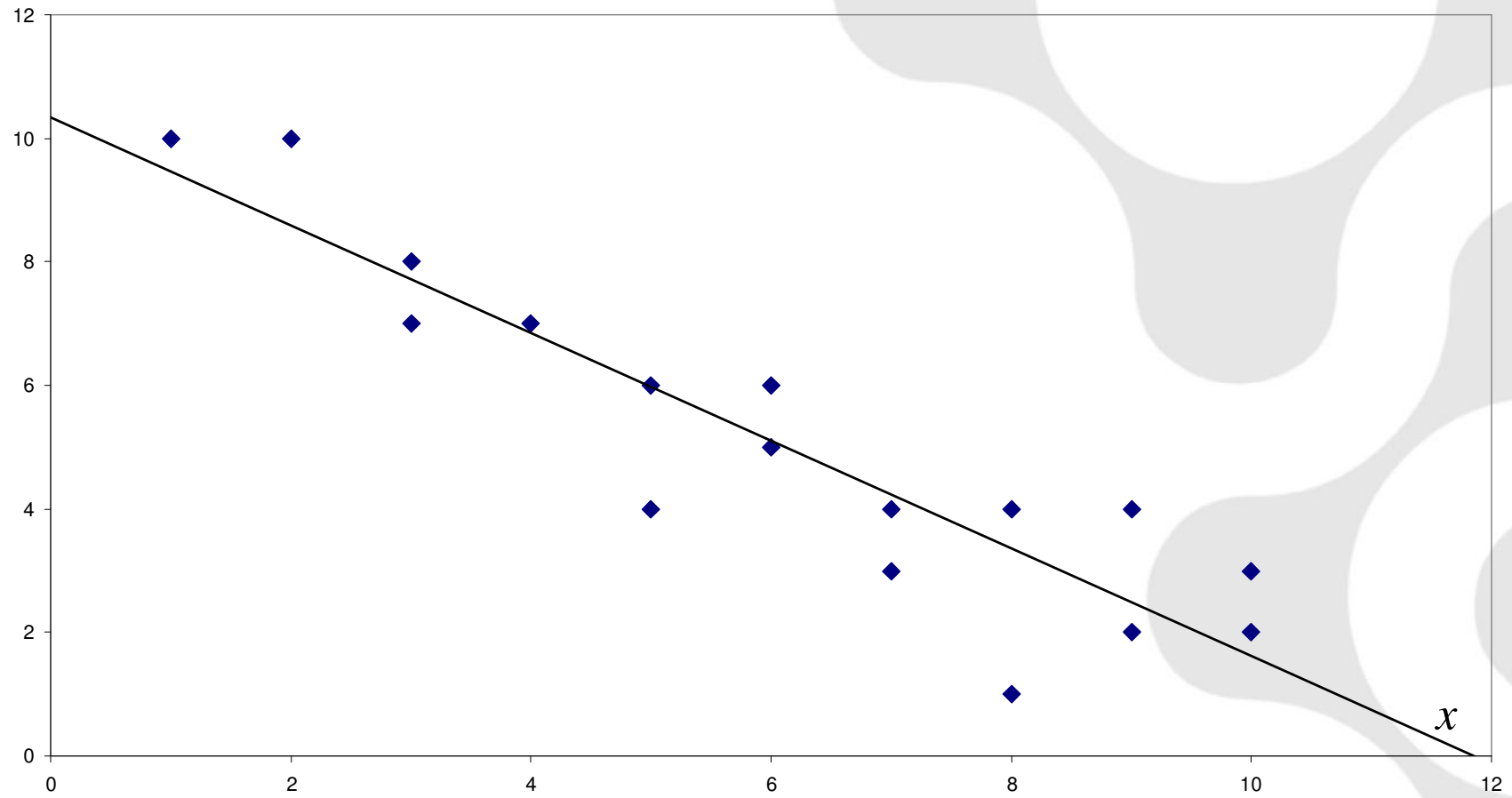
Describe the correlation between the marks scored in test A and test B

A Scatter Diagram to compare the marks of students in 2 maths tests



Negative Correlation

y

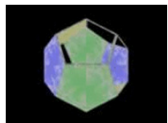


The sample or probability space shows all 36 outcomes when you add two normal dice together.

Dice 1

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

Dice 2



Total	Probability
1	$\frac{1}{36}$
2	
3	
4	
5	$\frac{4}{36}$
6	
7	
8	
9	
10	
11	
12	

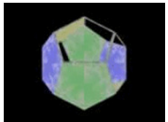
The sample space shows all 36 outcomes when you find the difference between the scores of two normal dice.

Dice 1

	1	2	3	4	5	6
1	0	1	2	3	4	5
2	1	0	1	2	3	4
3	2	1	0	1	2	3
4	3	2	1	0	1	2
5	4	3	2	1	0	1
6	5	4	3	2	1	0

Dice 2

Total	Probability
0	
1	$\frac{10}{36}$
2	
3	
4	$\frac{4}{36}$
5	



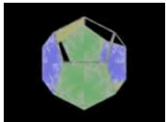
The **total probability** of all the mutually exclusive outcomes of an experiment is **1**

A bag contains 3 colours of beads, red, white and blue.

The probability of picking a red bead is **0.14**

The probability of picking a white bead is **0.2**

What is the probability of picking a blue bead?



The **total probability** of all the mutually exclusive outcomes of an experiment **is 1**

A bag contains 3 colours of beads, red, white and blue.

The probability of picking a red bead is **0.14**

The probability of picking a white bead is **0.2**

What is the probability of picking a blue bead?

$$0.14 + 0.2 = 0.34$$

$$1 - 0.34 = 0.66$$

