KING EDWARD VI
HANDSWORTH GRAMMAR
SCHOOL FOR BOYS

KING EDWARD VI
ACADEMY TRUST
BIRMINGHAM

Year 11

2024 Mathematics 2025

Unit 25 Booklet – Part 1

HGS Maths

Tasks

Dr Frost Course

Name: ______________________________

Class: ______________________________

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Contents

1 Exponential and Trigonometric Graphs

Exponential Graphs

Worked Example	**Your Turn**
Some money M has been invested in a bank. The value of the money after t years is modelled by the function $M(t) = 1750\times(1.02)^t$ State the initial amount of money invested.	Some money M has been invested in a bank. The value of the money after t years is modelled by the function $M(t) = 3000\times(1.005)^t$ State the initial amount of money invested.

Worked Example	**Your Turn**
Some money M has been invested in a bank. The value of the money after t years is modelled by the function $M(t) = 500 \times (1.04)^t$ Determine the interest rate offered by the bank.	Some money M has been invested in a bank. The value of the money after t years is modelled by the function $M(t) = 1250 \times (1.025)^t$ Determine the interest rate offered by the bank.

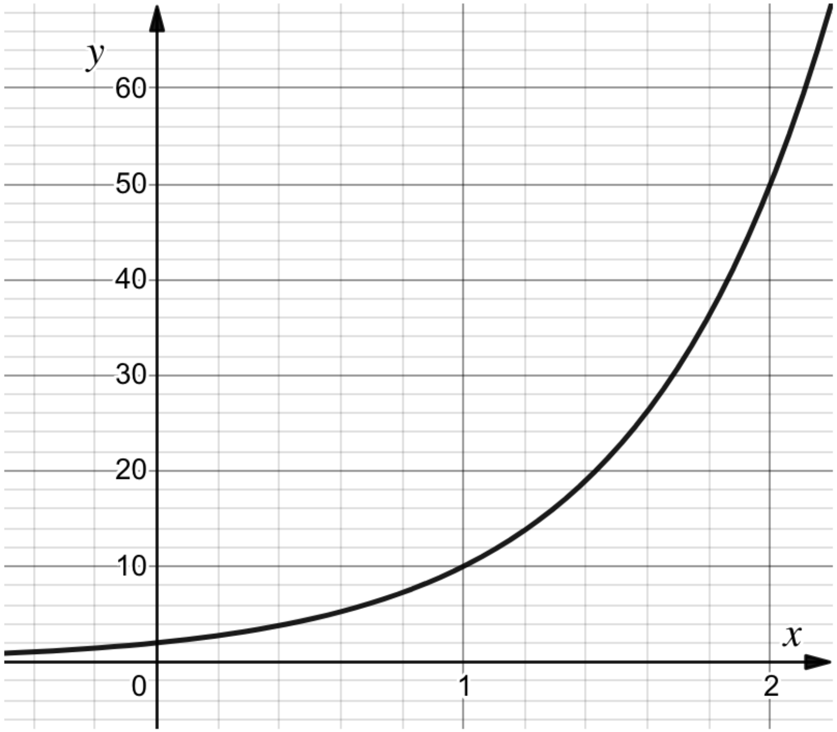
Dr Frost 424d

Worked Example	Your Turn
The sketch graph shows a curve with equation $y = ab^x$ The curve passes through the points $(0, 3.25)$ and $(3, 87.75)$. Calculate the value of a and the value of b.	The sketch graph shows a curve with equation $y = ab^x$ The curve passes through the points $(0, 2.75)$ and $(2, 68.75)$. Calculate the value of a and the value of b.

Dr Frost 425a

Worked Example

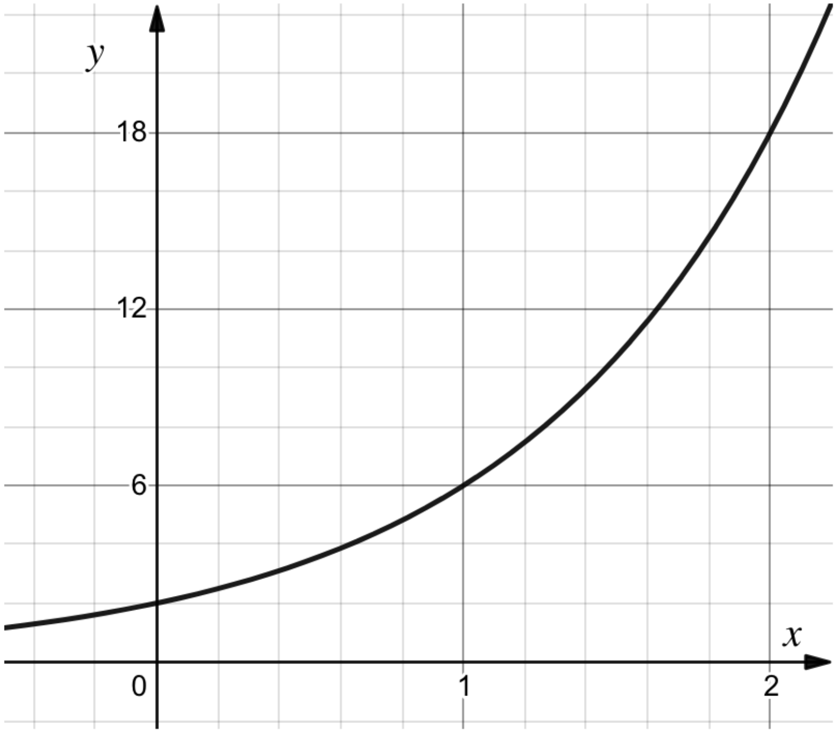
This graph shows a curve with equation $y = pq^x$



Calculate the value of p and q.

Your Turn

This graph shows a curve with equation $y = pq^x$



Calculate the value of p and q.

Worked Example	**Your Turn**
At the start of an experiment, a petri dish contained $4{,}000{,}000$ bacteria. After 4 days, there were $6{,}000{,}000$ bacteria. It is assumed that the number of bacteria is given by the formula $N = ar^t$ where N is the number of bacteria, t days after the start of the experiment. Calculate the number of bacteria 7 days after the start of the experiment, giving your answer to 3 significant figures.	At the start of an experiment, a petri dish contained $4{,}000{,}000$ bacteria. After 5 days, there were $13{,}000{,}000$ bacteria. It is assumed that the number of bacteria is given by the formula $N = ar^t$ where N is the number of bacteria, t days after the start of the experiment. Calculate the number of bacteria 11 days after the start of the experiment, giving your answer to 3 significant figures.

Dr Frost 425c

Trigonometric Graphs

Angle **(θ Degrees)**	$0°$	$30°$	$45°$	$60°$	$90°$	$180°$	$270°$	$360°$
$\sin(\theta)$								
$\cos(\theta)$								
$\tan(\theta)$								

Worked Example

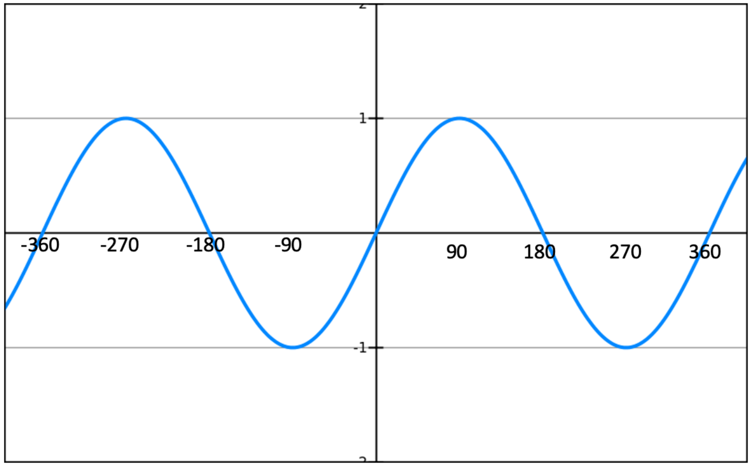
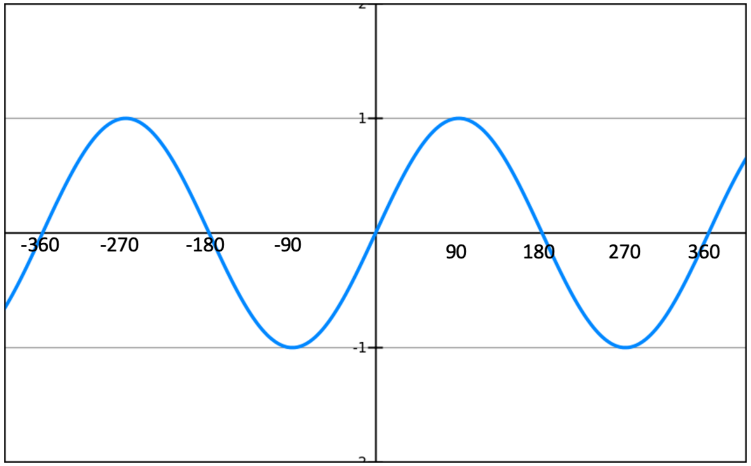
Sketch the graph $y = \sin(x)$ for $-360° \leq x \leq 360°$

Worked Example

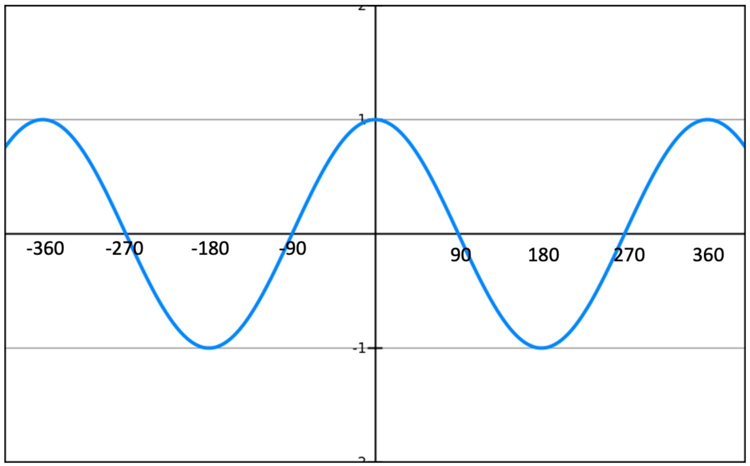
Sketch the graph $y = \cos(x)$ for $-360° \leq x \leq 360°$

Worked Example

Sketch the graph $y = \tan(x)$ for $-360° \leq x \leq 360°$

Worked Example	Your Turn
	
Suppose we know that $\sin(30) = 0.5$. By thinking about symmetry in the graph, work out:	Suppose we know that $\sin(60) = \frac{\sqrt{3}}{2}$. By thinking about symmetry in the graph, work out:
a) $\sin(150) =$	a) $\sin(240) =$
b) $\sin(-30) =$	b) $\sin(120) =$
c) $\sin(210) =$	c) $\sin(-60) =$

Worked Example



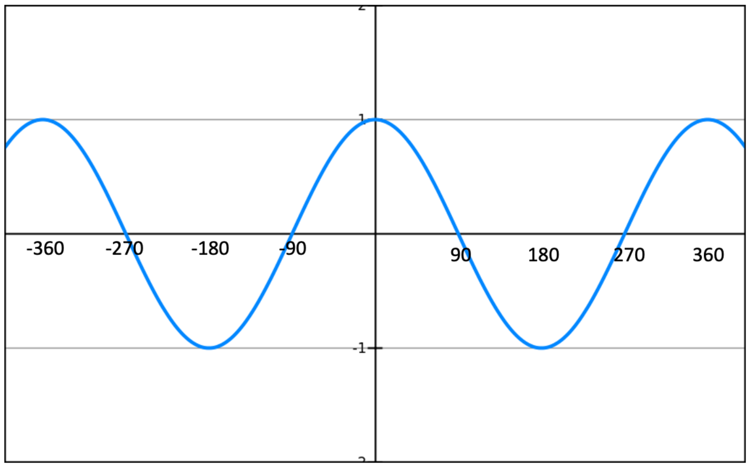
Suppose we know that $\cos(60) = 0.5$. By thinking about symmetry in the graph, work out:

a) $\cos(120) =$

b) $\cos(-60) =$

c) $\cos(240) =$

Your Turn



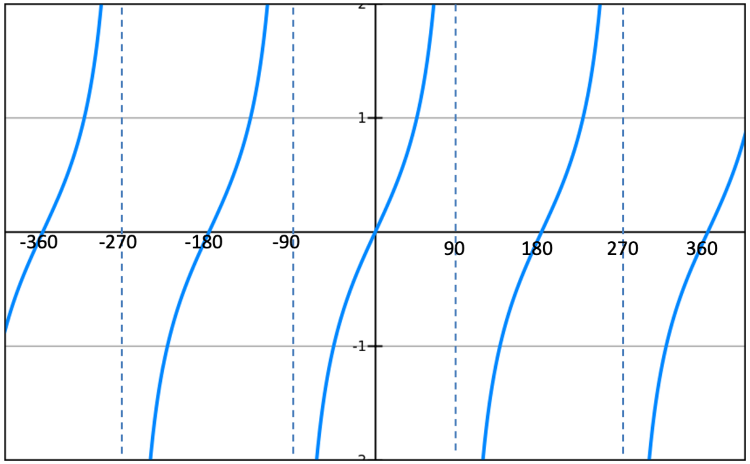
Suppose we know that $\cos(30) = \frac{\sqrt{3}}{2}$. By thinking about symmetry in the graph, work out:

a) $\cos(-30) =$

b) $\cos(210) =$

c) $\cos(150) =$

Worked Example

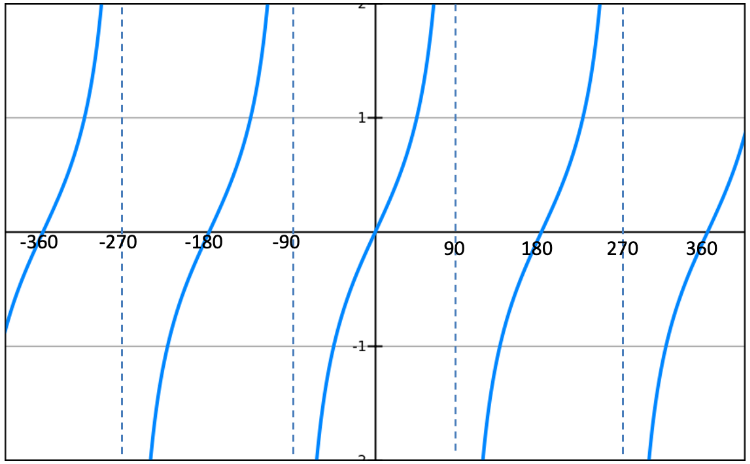


Suppose we know that $\tan(30) = \frac{1}{\sqrt{3}}$. By thinking about symmetry in the graph, work out:

a) $\tan(-30) =$

b) $\tan(150) =$

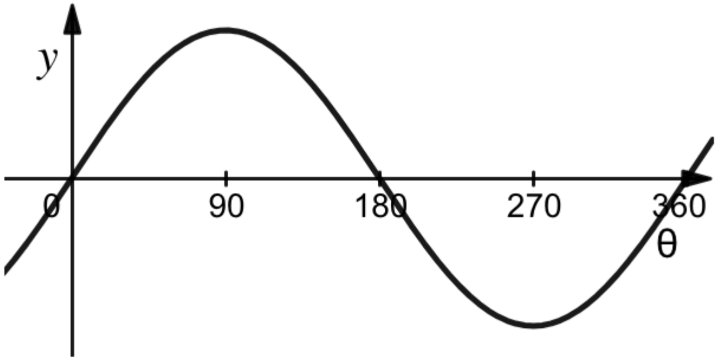
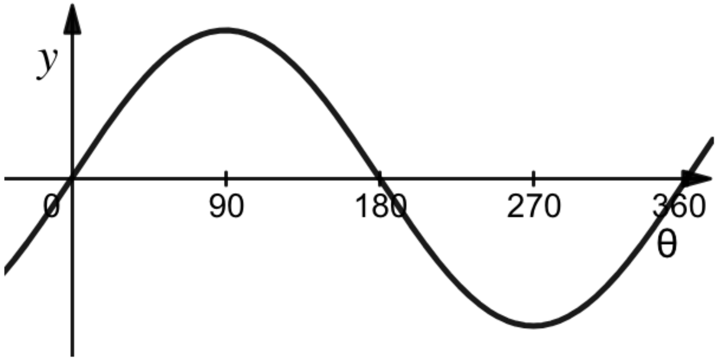
Your Turn



Suppose we know that $\tan(60) = \sqrt{3}$. By thinking about symmetry in the graph, work out:

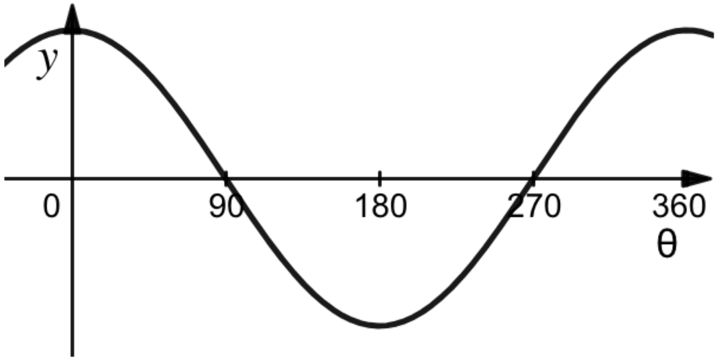
a) $\tan(120) =$

b) $\tan(-60) =$

Worked Example	Your Turn
Here is a graph of $y = \sin\theta$ for $0° \leq \theta \leq 360°$.  Solve $\sin\theta = -0.8$ for $0° \leq \theta \leq 360°$. Give your solutions correct to 2 decimal places.	Here is a graph of $y = \sin\theta$ for $0° \leq \theta \leq 360°$.  Solve $\sin\theta = 0.3$ for $0° \leq \theta \leq 360°$. Give your solutions correct to 2 decimal places.

Worked Example

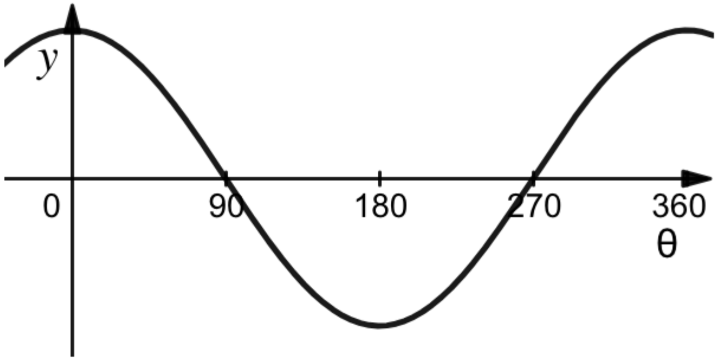
Here is a graph of $y = \cos\theta$ for $0° \leq \theta \leq 360°$.



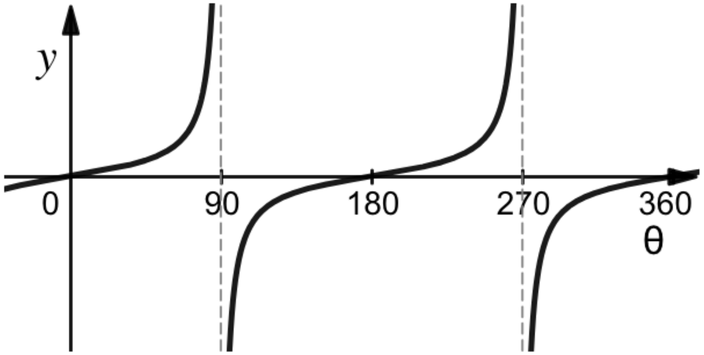
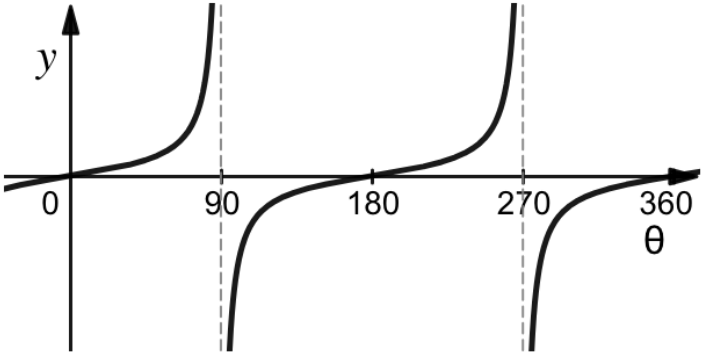
Solve $\cos\theta = 0.7$ for $0° \leq \theta \leq 360°$.
Give your solutions correct to 2 decimal places.

Your Turn

Here is a graph of $y = \cos\theta$ for $0° \leq \theta \leq 360°$.

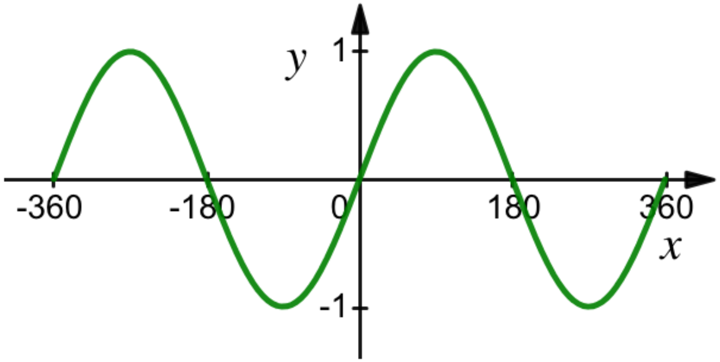


Solve $\cos\theta = -0.2$ for $0° \leq \theta \leq 360°$.
Give your solutions correct to 2 decimal places.

Worked Example	Your Turn
Here is a graph of $y = \tan\theta$ for $0° \leq \theta \leq 360°$.  Solve $\tan\theta = -7$ for $0° \leq \theta \leq 360°$. Give your solutions correct to 2 decimal places.	Here is a graph of $y = \tan\theta$ for $0° \leq \theta \leq 360°$.  Solve $\tan\theta = 6$ for $0° \leq \theta \leq 360°$. Give your solutions correct to 2 decimal places.

Worked Example

Here is the graph of $y = \sin x$ for the interval $-360 \leq x \leq 360°$.

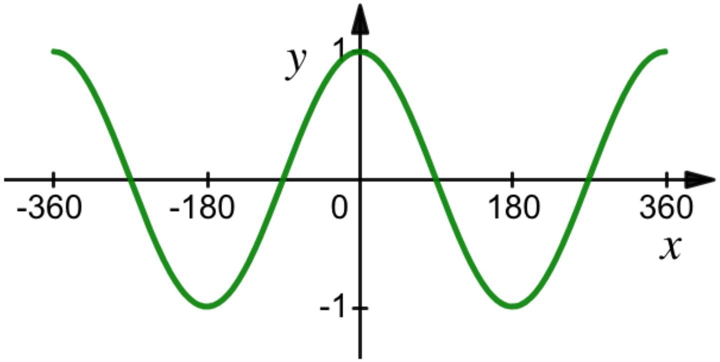


$x = 203.6$ is a solution to the equation $\sin x = -0.4$

Use the graph to find the other solutions to the equation in the interval $-360 \leq x \leq 360°$.
Give your solutions to one decimal place.

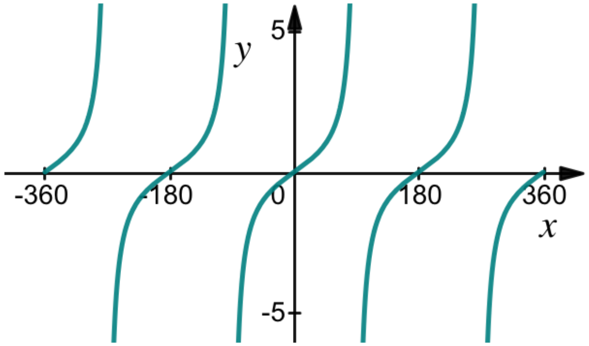
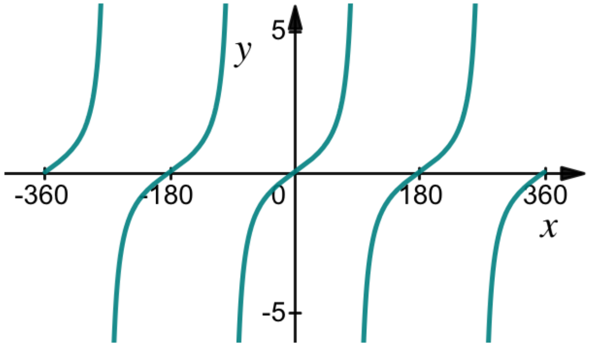
Your Turn

Here is the graph of $y = \cos x$ for the interval $-360 \leq x \leq 360°$.



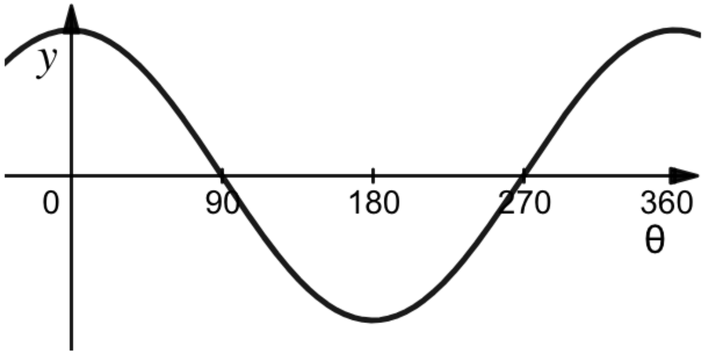
$x = 107.5$ is a solution to the equation $\cos x = -0.3$

Use the graph to find the other solutions to the equation in the interval $-360 \leq x \leq 360°$.
Give your solutions to one decimal place.

Worked Example	**Your Turn**
Here is the graph of $y = tan\, x$ for the interval $-360 \leq x \leq 360°$.  $x = 105.95$ is a solution to the equation $\tan x = -3.5$ Use the graph to find the other solutions to the equation in the interval $-360 \leq x \leq 360°$. Give your solutions to two decimal places.	Here is the graph of $y = tan\, x$ for the interval $-360 \leq x \leq 360°$.  $x = 56.31$ is a solution to the equation $\tan x = 1.5$ Use the graph to find the other solutions to the equation in the interval $-360 \leq x \leq 360°$. Give your solutions to two decimal places.

Worked Example

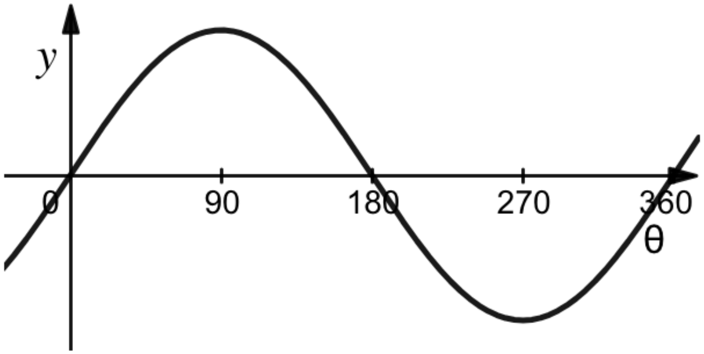
Here is a graph of $y = \cos\theta$ for $0° \leq \theta \leq 360°$.



Solve $\cos\theta = -0.4$ for $0° \leq \theta \leq 720°$.
Give your solutions correct to 2 decimal places.

Your Turn

Here is a graph of $y = \sin\theta$ for $0° \leq \theta \leq 360°$.



Solve $\sin\theta = -0.7$ for $0° \leq \theta \leq 720°$.
Give your solutions correct to 2 decimal places.

Extra Notes

2 Trigonometric Identities and Equations (L2FM Only)

Trigonometric Identities

Worked Example	Your Turn
It is given that α is acute and that $\cos\alpha = \frac{2}{3}$ Find the exact value of $\tan\alpha$	It is given that α is acute and that $\sin\alpha = \frac{4}{5}$ Find the exact value of $\tan\alpha$

Dr Frost 502a

Worked Example	Your Turn
Prove that $1-\frac{\tan\theta\cos^3\theta}{\sin\theta}\equiv\sin^2\theta$	Prove that $1-\tan\theta\sin\theta\cos\theta\equiv\cos^2\theta$

Worked Example	Your Turn
Prove that $\tan\theta - \frac{1}{\tan\theta} \equiv \frac{1-2\cos^2\theta}{\sin\theta\ cos\theta}$	Prove that $\tan\theta + \frac{1}{\tan\theta} \equiv \frac{1}{\sin\theta\cos\theta}$

Worked Example	Your Turn
Prove that $\frac{\cos\theta - \cos^3\theta}{\sin^3\theta} \equiv \frac{1}{\tan\theta}$	Prove that $\frac{\sin\theta - \sin^3\theta}{\cos^3\theta} \equiv \tan\theta$

Worked Example	Your Turn
Prove that $\frac{\sin^4 \theta - \cos^4 \theta}{\sin^2 \theta} \equiv 1 - \frac{1}{\tan^2 \theta}$	Prove that $\frac{\cos^4 \theta - \sin^4 \theta}{\cos^2 \theta} \equiv 1 - \tan^2 \theta$

Worked Example	**Your Turn**
Prove that $\frac{\frac{\sin x}{\tan x}}{\sqrt{1-\sin^2 x}} \equiv 1$	Prove that $\frac{\tan x \cos x}{\sqrt{1-\cos^2 x}} \equiv 1$

Worked Example	**Your Turn**
Prove that $\frac{1}{\tan^2\theta} \equiv \frac{1}{\sin^2\theta} - 1$	Prove that $\tan^2\theta \equiv \frac{1}{\cos^2\theta} - 1$

Trigonometric Equations

Worked Example	Your Turn
Solve $\cos x = -0.8$ in the interval $-180° \leq x \leq 540°$ Give your solution(s) correct to 1 decimal place where appropriate.	Solve $\sin x = -0.4$ in the interval $-180° \leq \theta \leq 360°$ Give your solution(s) correct to 1 decimal place where appropriate.

Worked Example	Your Turn
Solve $\tan x = 0.4$ in the interval $-180° \leq x \leq 180°$ Give your solution(s) correct to 1 decimal place where appropriate.	Solve $\tan x = -0.4$ in the interval $-180° \leq x \leq 180°$ Give your solution(s) correct to 1 decimal place where appropriate.

Dr Frost 503a

Worked Example	Your Turn
Solve $\sin^2 x = 0.53$ in the interval $-180° \leq x \leq 360°$ Give your solution(s) correct to 1 decimal place where appropriate.	Solve $\cos^2 x = 0.62$ in the interval $-180° \leq \theta \leq 360°$ Give your solution(s) correct to 1 decimal place where appropriate.

Dr Frost 503f

Worked Example	Your Turn
Solve $8\tan^2 x = -6\tan x - 1$ in the interval $0° < x < 540°$ Give your solution(s) correct to 1 decimal place where appropriate.	Solve $12\tan^2 x - \tan x = 1$ in the interval $0° < x < 540°$ Give your solution(s) correct to 1 decimal place where appropriate.

Dr Frost 503j

Worked Example	Your Turn
Solve $6\sin^2 x - 5\cos x = 2$ in the interval $0° \leq x < 540°$ Give your solution(s) correct to 2 decimal places where appropriate.	Solve $8\cos^2 x = 2\sin x + 5$ in the interval $0° \leq x < 540°$ Give your solution(s) correct to 2 decimal places where appropriate.

Dr Frost 503k

Extra Notes

3 Domain and Range (L2FM Only)

Worked Example	Your Turn
$f(x) = 3x^2 - 2$ The domain of $f(x)$ is $\{1, 2, 3, 4\}$. What is the range?	$g(x) = 2x^3 + 1$ The domain of $g(x)$ is $\{1, 2, 3, 4\}$. What is the range?

Worked Example	Your Turn
a) Work out a suitable domain and the range of $f(x) = x^2$ b) Work out a suitable domain and the range of $f(x) = \sqrt{x}$	a) Work out a suitable domain and the range of $f(x) = x^3$ b) Work out a suitable domain and the range of $f(x) = \sqrt[3]{x}$

Worked Example	Your Turn
$f(x) = \dfrac{x-3}{5x-6}$ State the value of x that cannot be in the domain of $f(x)$	$f(x) = \dfrac{3-x}{6x-5}$ State the value of x that cannot be in the domain of $f(x)$

Worked Example	Your Turn
$g(x) = x^2 - 6x + 5, x \in \mathbb{R}$ Determine the range of $g(x)$	$f(x) = x^2 - 4x + 7, x \in \mathbb{R}$ Determine the range of $f(x)$

Worked Example	Your Turn
$g(x) = 3x^2 - 2x + 4, x \in \mathbb{R}$ Determine the range of $g(x)$	$f(x) = 2x^2 + 7x - 7, x \in \mathbb{R}$ Determine the range of $f(x)$

Worked Example	Your Turn
$g(x) = 14 + 2x - x^2, x \in \mathbb{R}$ Determine the range of $g(x)$	$f(x) = 21 + 4x - x^2, x \in \mathbb{R}$ Determine the range of $f(x)$

Worked Example	Your Turn
$f(x)$ is a function with domain all values of x $f(x) = \sqrt{x^2 + 12x - a}$ where a is a constant Work out the possible values of a	$f(x)$ is a function with domain all values of x $f(x) = \sqrt{x^2 + 6x - a}$ where a is a constant Work out the possible values of a

Worked Example	Your Turn
$g(x) = x^2 + 6x + 5, x \geq 2$ Determine the range of $g(x)$	$f(x) = x^2 + 4x + 3, x \geq 1$ Determine the range of $f(x)$

Worked Example	Your Turn
$f(x) = 23 - 5x$ with domain $-3 < x \leq 1$ Work out the range of $f(x)$	$g(x) = 32 - 3x$ with domain $-5 \leq x < 2$ Work out the range of $g(x)$

Worked Example	Your Turn
Determine the range of: $g(x) = \sin x\, , 180 \leq x < 360°$	Determine the range of: $f(x) = \cos x\, , 180 < x \leq 360°$

Worked Example	Your Turn
$g(x) = \frac{8x-2}{x-1}, x \geq 7$ Work out the range of g	$f(x) = \frac{5x+3}{x-4}, x \geq 5$ Work out the range of f

Dr Frost 564i

Worked Example	Your Turn
$g(x)$ is an increasing function with domain $1 \leq x \leq 5$ and range $3 \leq g(x) \leq 11$. Construct a suitable function.	$f(x)$ is a decreasing function with domain $4 \leq x \leq 6$ and range $7 \leq f(x) \leq 19$. Construct a suitable function.

Extra Notes

4 Piecewise Functions (L2FM Only)

Worked Example	Your Turn
$f(x) = \begin{cases} x^2 + 4, & -8 \leq x \leq 0 \\ 3x + 4, & 0 < x \leq 7 \end{cases}$ Work out the value of $f(-3)$	$f(x) = \begin{cases} x^2 + 1, & 0 \leq x \leq 3 \\ 2x + 4, & 3 < x \leq 8 \end{cases}$ Work out the value of $f(7)$

Dr Frost 487a

Worked Example	Your Turn
$f(x) = \begin{cases} (x-2)^2 + 1, & 0 \leq x < 3 \\ \frac{1}{4}x + \frac{5}{4}, & 3 \leq x \leq 7 \end{cases}$ Sketch the graph of $y = f(x)$	$f(x) = \begin{cases} (x-1)^2 + 2, & 0 \leq x < 2 \\ \frac{1}{3}x + \frac{7}{3}, & 2 \leq x \leq 5 \end{cases}$ Sketch the graph of $y = f(x)$

Worked Example	Your Turn
$f(x)=\begin{cases} 3, & 0\le x<1 \\ x^2+2, & 1\le x<2 \\ 8-x, & 2\le x<3 \end{cases}$ Sketch the graph of $y=f(x)$	$f(x)=\begin{cases} x^2, & 0\le x<1 \\ 1, & 1\le x<2 \\ 3-x, & 2\le x<3 \end{cases}$ Sketch the graph of $y=f(x)$

Dr Frost 487b

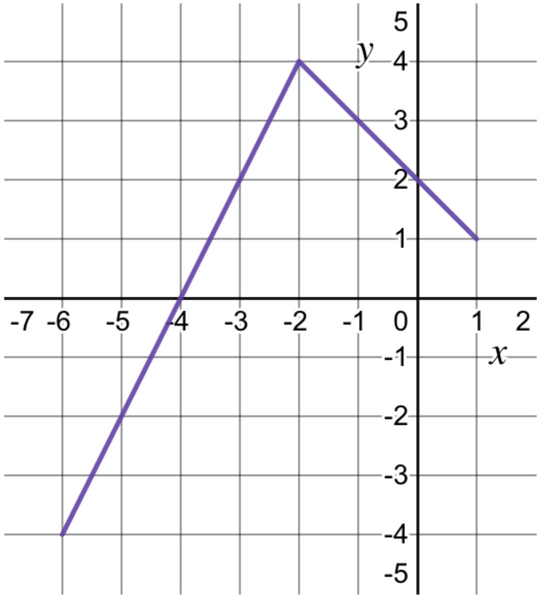
Worked Example

The function $f(x)$ is defined as

$$f(x) = \begin{cases} p, & -6 \leq x \leq -2 \\ q, & -2 < x \leq 1 \end{cases}$$

where p and q are unknown expressions.

The graph of $y = f(x)$ is shown below.



Find the expressions represented by p and q.

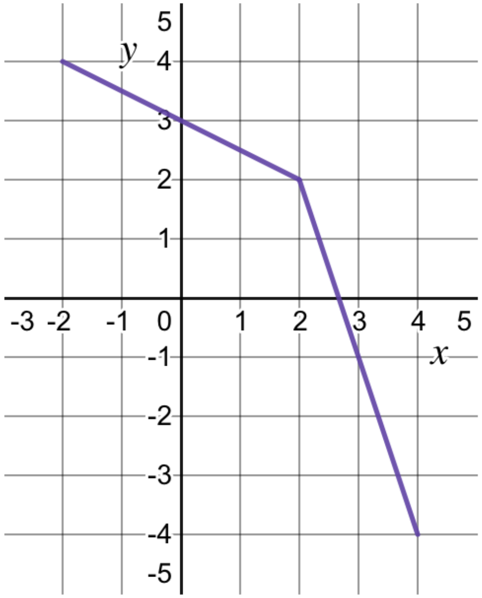
Your Turn

The function $f(x)$ is defined as

$$f(x) = \begin{cases} p, & -2 \leq x \leq 2 \\ q, & 2 < x \leq 4 \end{cases}$$

where p and q are unknown expressions.

The graph of $y = f(x)$ is shown below.



Find the expressions represented by p and q.

Dr Frost 487c

Worked Example	Your Turn
$f(x) = \begin{cases} (x-a)^2 + b, & 0 \le x < 3 \\ cx + d, & 3 \le x \le 7 \end{cases}$ The graph of $y = f(x)$ passes through the points $(0, 5)$, $(2, 1)$, $(3, 2)$ and $(7, 3)$ Find the values of a, b, c and d	$f(x) = \begin{cases} (x-a)^2 + b, & 0 \le x < 2 \\ cx + d, & 2 \le x \le 5 \end{cases}$ The graph of $y = f(x)$ passes through the points $(0, 3)$, $(1, 2)$, $(2, 3)$ and $(5, 3)$ Find the values of a, b, c and d

Worked Example	Your Turn
The function $f(x)$ is defined as $f(x) = \begin{cases} x^2 + 7, & -2 \leq x \leq 2 \\ 15 - 2x, & 2 < x \leq 7 \end{cases}$ Solve $f(x) = 8$	The function $f(x)$ is defined as $f(x) = \begin{cases} -2x - 10, & -4 \leq x \leq -2 \\ -x^2 - 2, & -2 < x \leq 2 \end{cases}$ Solve $f(x) = -3$

Worked Example	Your Turn
The function $f(x)$ is defined for all x: $f(x) = \begin{cases} 9, & x < -3 \\ x^2, & -3 \leq x \leq 3 \\ 15 - 2x, & x > 3 \end{cases}$ Determine the range of $f(x)$	The function $f(x)$ is defined for all x: $f(x) = \begin{cases} 4, & x < -2 \\ x^2, & -2 \leq x \leq 2 \\ 12 - 4x, & x > 2 \end{cases}$ Determine the range of $f(x)$

Dr Frost 487f

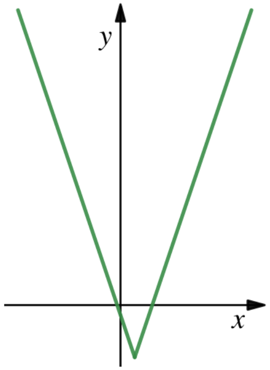
Worked Example

The function $f(x)$ is defined as

$$f(x) = \begin{cases} p, & -7 \leq x \leq 1 \\ q, & 1 < x \leq 9 \end{cases}$$

where p and q are unknown expressions.

The graph of $y = f(x)$ is shown below.



The graph is symmetrical about $x = 1$.
The range of $f(x)$ is $-6 \leq f(x) \leq 34$.
Find the expressions represented by p and q.

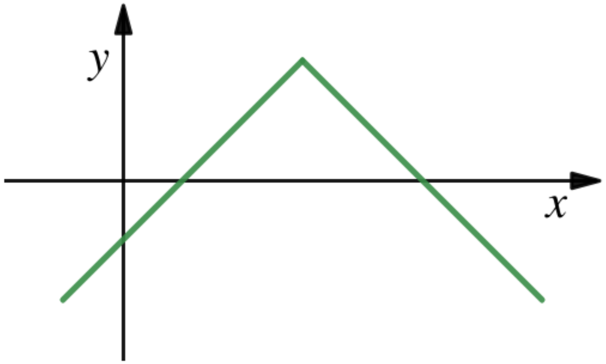
Your Turn

The function $f(x)$ is defined as

$$f(x) = \begin{cases} p, & -1 \leq x \leq 3 \\ q, & 3 < x \leq 7 \end{cases}$$

where p and q are unknown expressions.

The graph of $y = f(x)$ is shown below.



The graph is symmetrical about $x = 3$.
The range of $f(x)$ is $-2 \leq f(x) \leq 2$.
Find the expressions represented by p and q.

Dr Frost 487g

Worked Example	Your Turn
The function $f(x)$ is defined as $f(x)=\begin{cases} 2, & 0 \leq x \leq 5 \\ 2x-8, & 5 < x \leq 7 \\ 27-3x, & 7 < x \leq 9 \end{cases}$ Find the area enclosed by the graph of $y=f(x)$, the y-axis and the x-axis.	The function $f(x)$ is defined as $f(x)=\begin{cases} 2, & 0 \leq x \leq 5 \\ x-3, & 5 < x \leq 8 \\ 45-5x, & 8 < x \leq 9 \end{cases}$ Find the area enclosed by the graph of $y=f(x)$, the y-axis and the x-axis.

Dr Frost 487h

Extra Notes

5 Graph Transformations

Worked Example	**Your Turn**
The point $A(2,5)$ is on the graph of $y = f(x)$. Write the new coordinates of A after the transformation:	The point $A(3,4)$ is on the graph of $y = f(x)$. Write the new coordinates of A after the transformation:
a) $y = f(x) + 3$	a) $y = f(x) - 4$
b) $y = f(x + 3)$	b) $y = f(x - 4)$
c) $y = -f(x)$	c) $y = f(-x)$
d) $y = f(-x)$	d) $y = -f(x)$
e) $y = -f(x) + 3$	e) $y = -f(x) - 6$
f) $y = f(-x) + 3$	f) $y = -f(-x) - 6$

Dr Frost 448d, 448c, 449c and 449d

Worked Example	Your Turn
Sketch $y = \cos x + 1, 0 \leq x \leq 360°$	Sketch $y = \sin x - 2, 0 \leq x \leq 360°$

Worked Example	Your Turn
Sketch $y = \sin(x - 45°)$, $0 \leq x \leq 360°$	Sketch $y = \cos(x + 45°)$, $0 \leq x \leq 360°$

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Worked Example	**Your Turn**
Sketch $y = -\sin x,\ 0 \leq x \leq 360°$	Sketch $y = -\tan x,\ 0 \leq x \leq 360°$

Worked Example	Your Turn
Sketch $y = \cos(-x)$, $0 \leq x \leq 360°$	Sketch $y = \tan(-x)$, $0 \leq x \leq 360°$

Dr Frost 449e

Worked Example

The graph of $y = f(x)$ is shown in Figure 1.

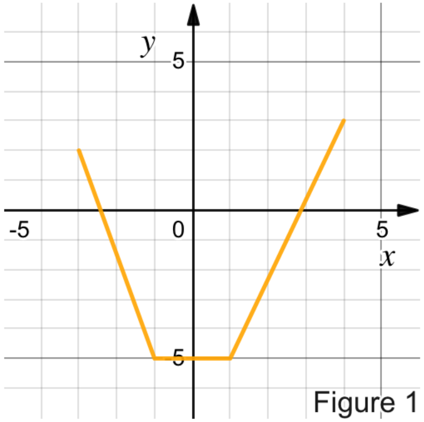

Figure 1

The graph of $y = f(x) + a$ is shown in Figure 2.

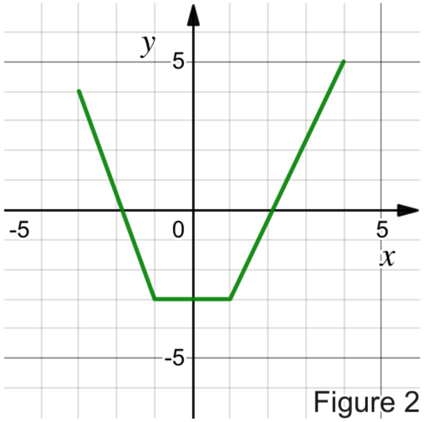

Figure 2

Determine the value of a.

Your Turn

The graph of $y = f(x)$ is shown in Figure 1.

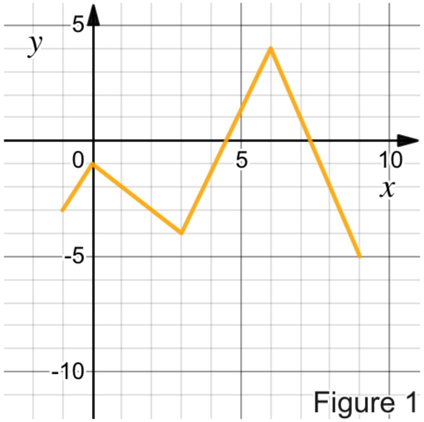

Figure 1

The graph of $y = f(x) + a$ is shown in Figure 2.

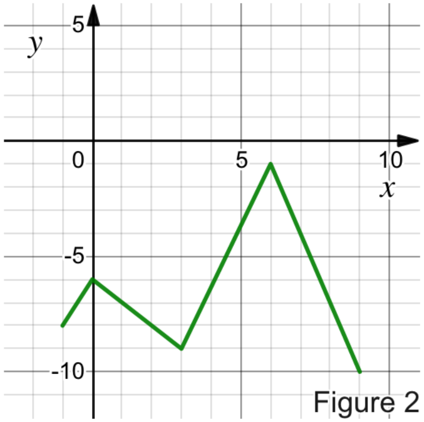

Figure 2

Determine the value of a.

Worked Example

The graph of $y = f(x)$ is shown in Figure 1.

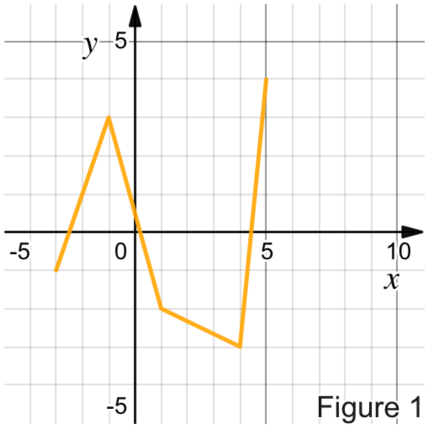

Figure 1

The graph of $y = f(x + a)$ is shown in Figure 2.

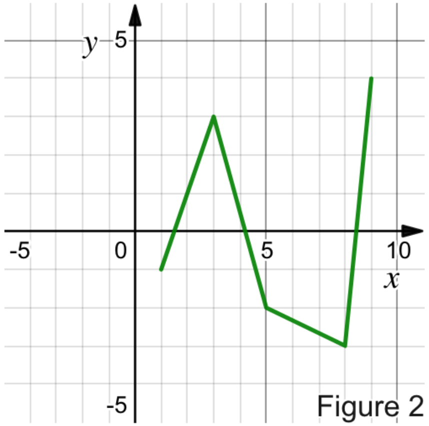

Figure 2

Determine the value of a.

Your Turn

The graph of $y = f(x)$ is shown in Figure 1.

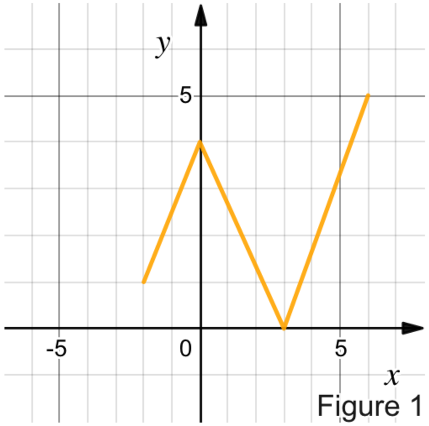

Figure 1

The graph of $y = f(x + a)$ is shown in Figure 2.

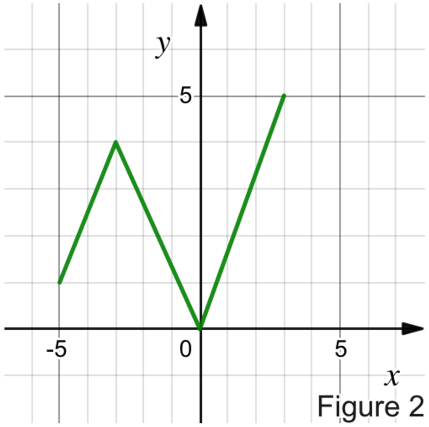

Figure 2

Determine the value of a.

Worked Example	Your Turn
a) The curve $y = \cos(4x + 90)$ is translated by $\begin{pmatrix} 30 \\ 0 \end{pmatrix}$ State the equation of the new curve after this transformation.	a) The curve $y = \tan(3x - 30)$ is translated by $\begin{pmatrix} 0 \\ -3 \end{pmatrix}$ State the equation of the new curve after this transformation.
b) The curve $y = \frac{4}{2x-5}$ is translated by $\begin{pmatrix} 0 \\ 3 \end{pmatrix}$ State the equation of the new curve after this transformation.	b) The curve $y = \frac{1}{3x-3}$ is translated by $\begin{pmatrix} -4 \\ 0 \end{pmatrix}$ State the equation of the new curve after this transformation.

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Worked Example	Your Turn
The curve $y = 2x^2 + 3x$ is translated by $\begin{pmatrix}-4\\5\end{pmatrix}$ State the equation of the new curve after this transformation.	The curve $y = 2x^3 - x^2$ is translated by $\begin{pmatrix}3\\-4\end{pmatrix}$ State the equation of the new curve after this transformation.

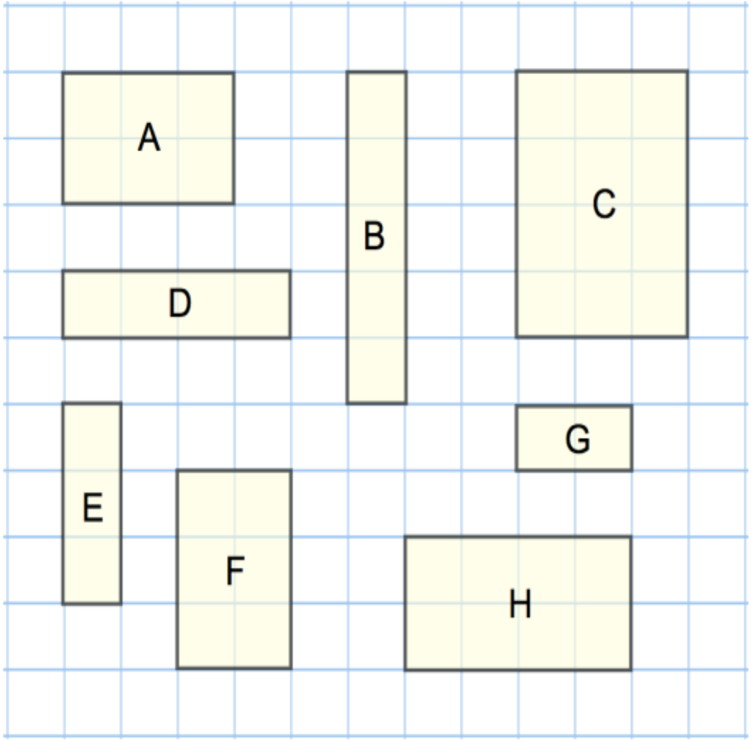
Fill in the Gaps

$f(x)$	Function notation	Description of translation	Vector of translation	New function
$2x+1$	$f(x-3)$	3 places right	$\begin{pmatrix}3\\0\end{pmatrix}$	$f(x-3)= 2(x-3)+1$ $=2x-6+1$ $=2x-5$
$3x+1$	$f(x-2)$			
x^2	$f(x-1)$			
x^2		2 places left		
x^2+5			$\begin{pmatrix}-3\\0\end{pmatrix}$	
				$4(x+5)+2$
x^2+2x-1		1 place left		
	$f(x-4)$			

Extra Notes

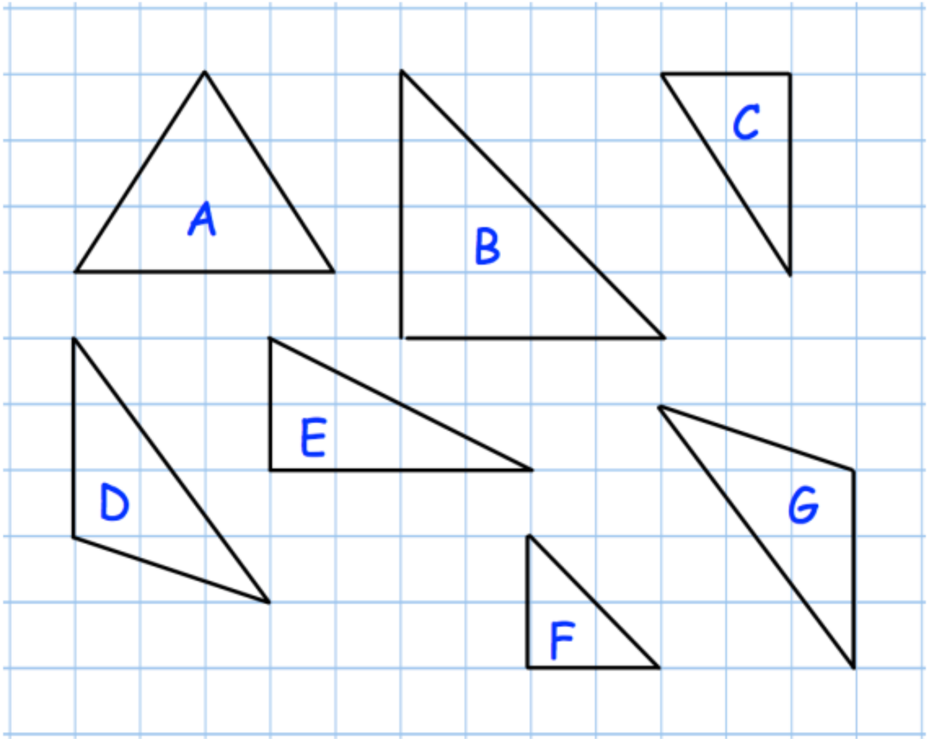
6 Congruency

Worked Example



a) Which two shapes are congruent?
b) Which two shapes are similar?

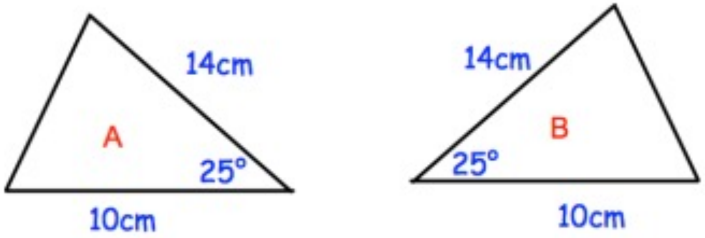
Your Turn



a) Which two shapes are congruent?
b) Which two shapes are similar?

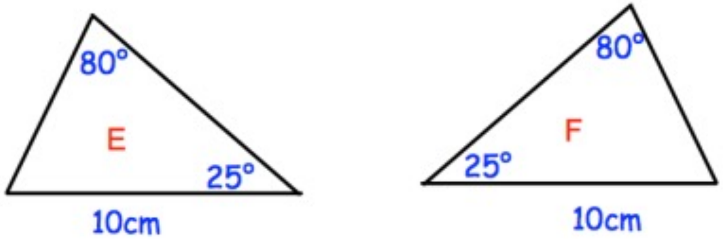
Worked Example

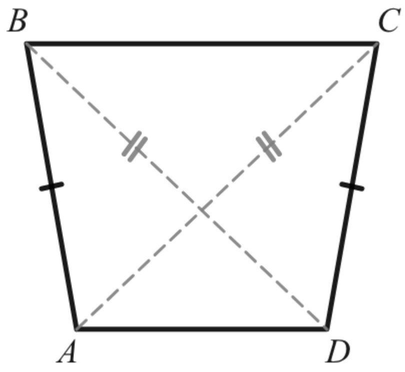
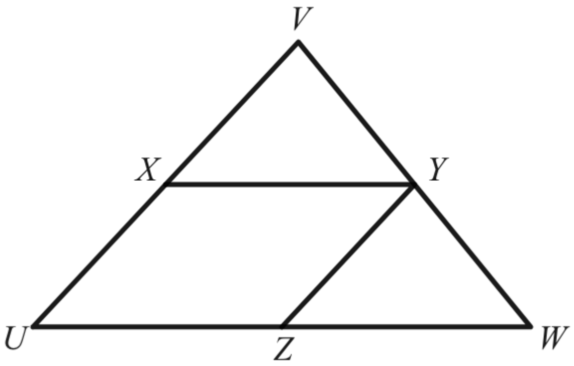
State the condition why these two triangles are congruent.



Your Turn

State the condition why these two triangles are congruent.



Worked Example	Your Turn
Below is a quadrilateral $ABCD$.  Prove that triangle ABD is congruent to triangle ACD.	The diagram shows triangle UVW.  $UXYZ$ is a parallelogram where X is the midpoint of UV, Y is the midpoint of VW, and Z is the midpoint of UW. Prove that triangle XVY and triangle ZYW are congruent.

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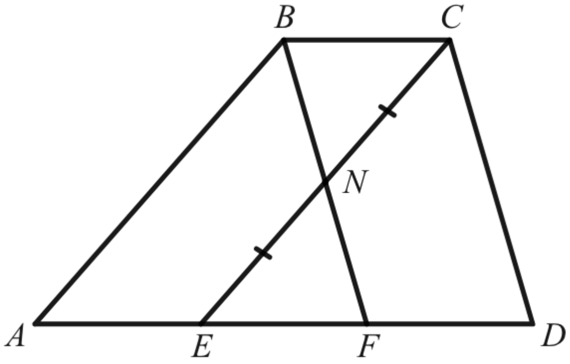
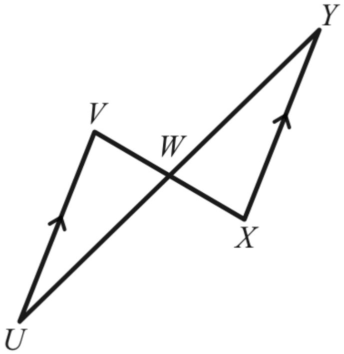
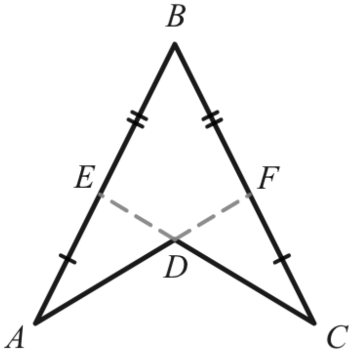
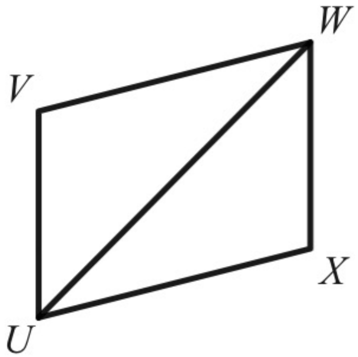
Worked Example	Your Turn
In the diagram below, $ABCE$ and $BCDF$ are parallelograms and N is the midpoint of CE.  Prove that triangle BCN and triangle EFN are congruent.	In the diagram below, UWY and VWX are straight lines.  UV and XY are parallel. W is the midpoint of UWY. Prove that triangle UVW and triangle WXY are congruent.

Worked Example	Your Turn
Below is a quadrilateral $ABCD$.  Prove that triangle ABF and triangle BCE are congruent.	The diagram below shows a parallelogram $UVWX$.  Prove that triangle UVW and triangle UWX are congruent.

Dr Frost 471c

<table>
<tr><th>Worked Example</th><th>Your Turn</th></tr>
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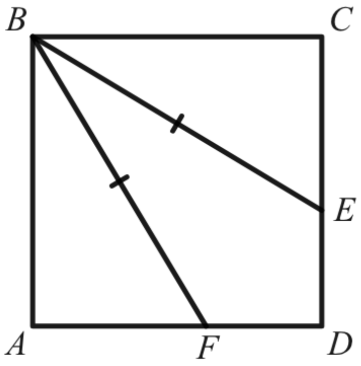
Below is a square $ABCD$.

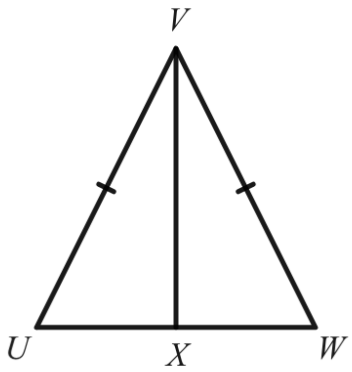


$BE = BF$

Prove that triangle ABF and triangle BCE are congruent.

</td><td>

Below is an isosceles triangle UVW.



VX is the perpendicular bisector of UW.

Prove that triangle UVX and triangle VWX are congruent.

</td></tr>
</table>

Extra Notes

7 Circle Theorem Proofs

Worked Example

Prove angles in a semicircle are 90°.

Worked Example

Prove the angle at the centre of a circle is twice the angle at the circumference.

Worked Example

Prove angles in the same segment are equal.

Worked Example

Prove opposite angles of a cyclic quadrilateral add to 180°.

Worked Example

Prove the alternate segment theorem.

Extra Notes