Mathematics Department

Mathematics N5

UNIT 2

Revision Materials

Relationships Skills Builder

Layout and content of the Unit Assessment will be different. This is not meant to be a carbon copy of the Unit Assessment. This booklet is an opportunity to practice all of the essential skills required to pass the Unit Assessment.

Outcomes and assessment standards

Outcome 1

The learner will:
1 Use mathematical operational skills linked to relationships by:

R 1.1 Applying algebraic skills to linear equations
R 1.2 Applying algebraic skills to graphs of quadratic relationships
R 1.3 Applying algebraic skills to quadratic equations
R 1.4 Applying geometric skills to lengths, angles and similarity
R 1.5 Applying trigonometric skills to graphs and identities

Outcome 2

2 Use mathematical reasoning skills linked to relationships by:

R 2.1 Interpreting a situation where mathematics can be used and identifying a valid strategy
R 2.2 Explaining a solution and/or relating it to context

FORMULAE SHEET

The roots of $ax^2 + bx + c = 0 \quad are \;\; x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Sine Rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine Rule: $a^2 = b^2 + c^2 - 2bc\cos A \quad or \quad \cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

Area of a triangle $A = \frac{1}{2}ab\sin C$

Volume of a sphere $V = \dfrac{4}{3}\pi r^3$

Volume of a cone $V = \dfrac{1}{3}\pi r^2 h$

Volume of a Pyramid $V = \dfrac{1}{3}Ah$

Standard Deviation $s = \sqrt{\dfrac{\sum(x - \bar{x})^2}{n-1}} = \sqrt{\dfrac{\sum x^2 - {(\sum x)^2}/{n}}{n-1}}$ *where n is the sample size*

R 1.1 Applying algebraic skills to linear equations

Q1. Determine the equations of these straight lines.

	Gradient	Passing Through the point		Gradient	Passing Through the point
a	-3	$(1,2)$	***h***	$\frac{3}{4}$	$(4,1)$
b	2	$(-3,2)$	***i***	$\frac{5}{2}$	$(3,-1)$
c	5	$(5,-2)$	***j***	$-\frac{2}{3}$	$(-3,-3)$
d	1	$(-1,-4)$	***k***	$-\frac{5}{6}$	$(0,-5)$
e	-1	$(5,2)$	***l***	$\frac{4}{5}$	$(3,0)$
f	-2	$(-7,-2)$	***m***	$-\frac{11}{7}$	$(3,-7)$
g	$\frac{1}{2}$	$(3,-5)$	***n***	$\frac{7}{2}$	$(-1,-1)$

Q2. Solve the inequations.

a	$7+5b \geq 42$	***b***	$61 \leq 4c+9$	***c***	$-8+3d > 40$
d	$2 < 16+7x$	***e***	$15+2y \leq 3$	***f***	$-22+9z > 59$
g	$7 < 3x-44$	***h***	$43 \geq 43+6y$	***i***	$a-4 < 3a+6$
j	$2b+5 \geq 5b-13$	***k***	$3c-4 > 8c+15$	***l***	$2x+33 \leq 6x-1$
m	$7q+2 < 5q-2$	***n***	$7r-3 \geq 2r+32$	***o***	$5r-3 \geq 4r+1$
p	$4p-7 \geq 4-2p$	***q***	$6b+5 \leq 4b+17$	***r***	$10d-43 \geq 3d+6$
s	$4x+35 > x-4$	***t***	$5y-2 < 2y-41$	***u***	$9z+14 \geq 5z+62$
v	$6x-17 \leq x-37$	***w***	$3(4-m) < 5$	***x***	$4n+54 < 9n+25$

Q3. **a)** John takes his family ice skating.

Entrance and skate hire comes to a total of £26.50 for 1 Adult and 4 Children.

Write an equation to represent this information.

b) David buys tickets for the cinema for his family.

Lunch comes to a total of £32.50 for 2 Adult and 3 Children.

Write an equation to represent this information.

c) Paul pops out to buy lunch for his workmates.

Lunch comes to a total of £29.50 for 4 cheeseburgers and 3 hotdogs.

Write an equation to represent this information.

d) Peter goes to a music store which is having a sale. All DVD's are the same price and all CD's are the same price.

Peter Bought 4 DVD's and 3 CD's for £22.75

Write an equation to represent this information.

Q4. Solve the following systems of equations algebraically.

a) $5x + 2y = -19$ and $4x + 3y = -18$

b) $6x + 8y = -8$ and $11x + 2y = -2$

c) $4y - 7x = 37$ and $3x - 2y = -17$

d) $3y - 5x = -50$ and $7x - 2y = 59$

e) $2x + 3y = 26$ and $3x - y = 6$

f) $4x + y = 17$ and $3x + 2y = 14$

g) $5x + 2y = -1$ and $2x + 6y = 20$

h) $2x - 6y = 24$ and $7x + 2y = 15$

i) $5x - 3y = -2$ and $3x + y = -9$

j) $4x - 3y = 19$ and $2x + 2y = 20$

k) $3x + 7y = 12$ and $9x - 5y = 36$

l) $8x - 4y = 0$ and $5x + 12y = 29$

Q5. Change the subject of the following equations to the variable stated in the brackets.

a $v = \frac{1}{3}\pi r^2 h$ $(\text{to } r)$ ***b*** $v = \frac{4}{3}\pi r^3$ $(\text{to } r)$ ***c*** $C = \frac{5}{9}(F - 32)$ $(\text{to } F)$

d $C = 25h + 20$ $(\text{to } h)$ ***e*** $y = ax + b$ $(\text{to } b)$ ***f*** $v = u + at$ $(\text{to } u)$

g $y = mx + c$ $(\text{to } m)$ ***h*** $V = lbh$ $(\text{to } l)$ ***i*** $E = mgh$ $(\text{to } g)$

j $I = \frac{V}{R}$ $(\text{to } R)$ ***k*** $S = \frac{D}{T}$ $(\text{to } D)$ ***l*** $S = \frac{D}{T}$ $(\text{to } T)$

m $A = l^2$ $(\text{to } l)$ ***n*** $S = 6l^2$ $(\text{to } l)$ ***o*** $v = \pi r^2 h$ $(\text{to } r)$

p $A = s^2 b$ $(\text{to } s)$ ***q*** $A = 4\pi r^2$ $(\text{to } r)$ ***r*** $P = 4\sqrt{A}$ $(\text{to } A)$

s $A = \frac{1}{2}bh$ $(\text{to } h)$ ***t*** $x = \sqrt{\frac{A}{6}}$ $(\text{to } A)$ ***u*** $E = \frac{1}{2}mv^2$ $(\text{to } v)$

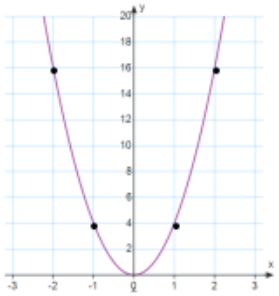
v $c = \sqrt{\frac{E}{m}}$ $(\text{to } E)$ ***w*** $s = ut + \frac{1}{2}at^2$ $(\text{to } a)$ ***x*** $T = 2\pi\sqrt{\frac{m}{k}}$ $(\text{to } k)$

R 1.2 Applying algebraic skills to graphs of quadratic relationships

Q6. The diagrams below show parabolas with the equation $y = kx^2$.

What is the value of k?

a)



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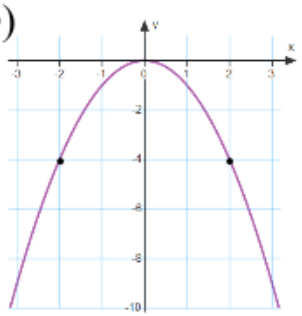

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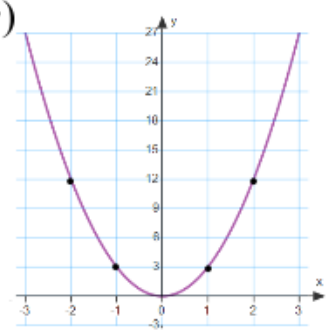

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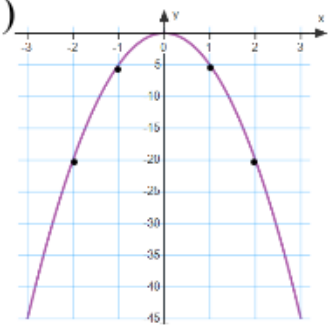

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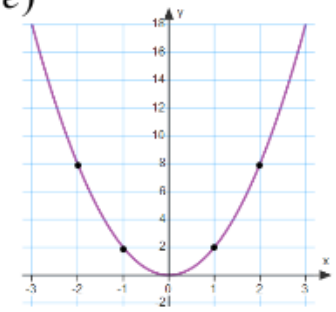

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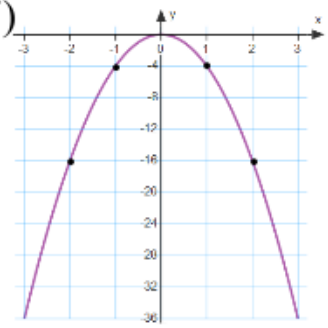

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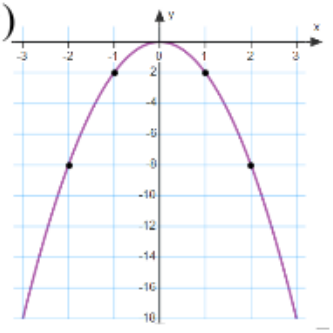

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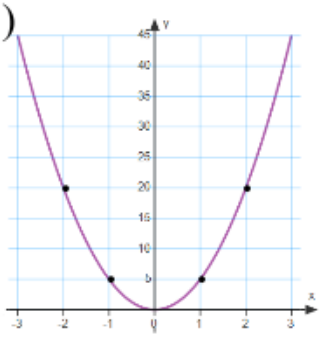

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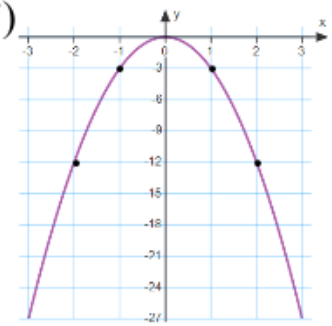
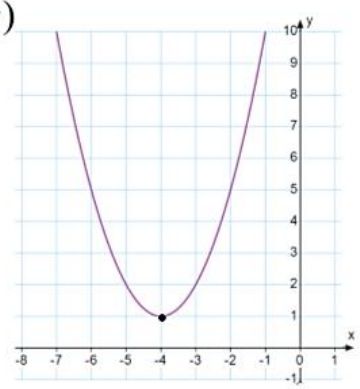


Q7. The diagrams below show parabolas in the form $y = (x + a)^2 + b$.

Identify the values of a *and* b for each one.

a)



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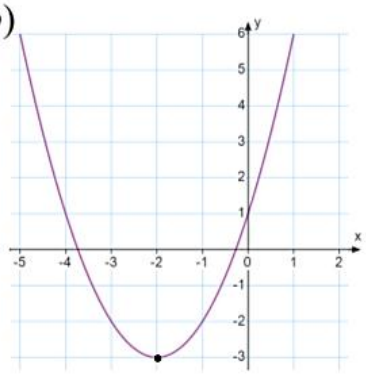

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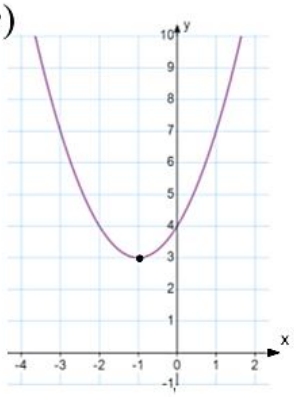

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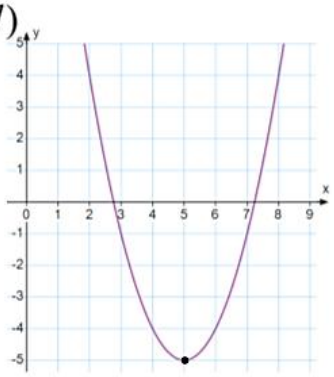

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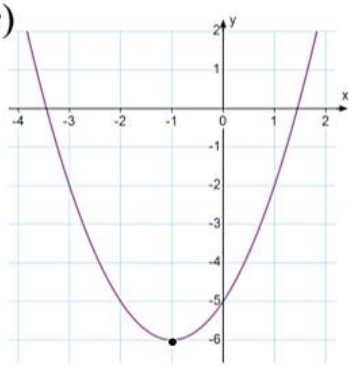

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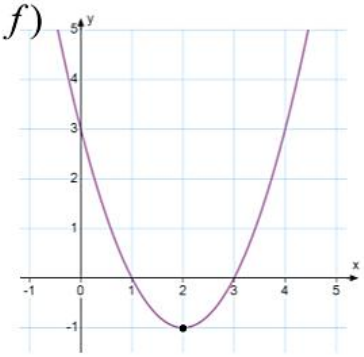

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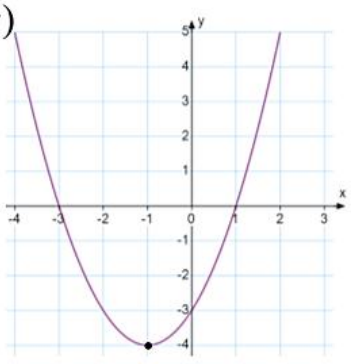

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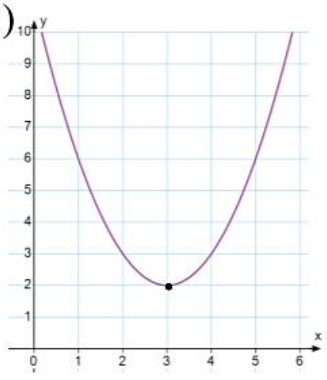
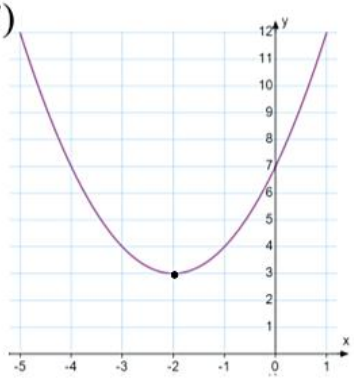


i)



Q8. Sketch the graphs of the following functions, clearly indicating any roots, turning points and where it cuts the $y\ axis$.

a	$y = (x-1)(x+5)$	**g**	$y = (x-4)(x+2)$
b	$y = (x+2)(x-6)$	**h**	$y = (x-5)(x-1)$
c	$y = (x-4)(x+4)$	**i**	$y = (x+2)(x+10)$
d	$y = (x-3)(x+7)$	**j**	$y = (x-5)(x+1)$
e	$y = (x-8)(x-2)$	**k**	$y = (x+7)(x+1)$
f	$y = (x+3)(x+9)$	**l**	$y = (x-7)(x+2)$

Q9. For each of the following equations, identify:

i) The axis of symmetry.

ii) The turning point.

iii) The nature of the turning point.

a	$y = (x-1)^2 + 5$	**g**	$y = -(x-1)^2 - 3$
b	$y = (x+4)^2 - 3$	**h**	$y = (x+2)^2 + 2$
c	$y = -(x-7)^2 + 4$	**i**	$y = (x-2)^2 - 7$
d	$y = (x+3)^2 - 2$	**j**	$y = -(x+3)^2 + 1$
e	$y = (x-3)^2 - 3$	**k**	$y = (x-4)^2$
f	$y = -(x+1)^2 + 6$	**l**	$y = -(x)^2 - 4$

Q10. Solve the following equations

a	$(x-1)(x+2)=0$	**g**	$(x+1)(x+7)=0$
b	$(x+5)(x+4)=0$	**h**	$(x+5)(x-5)=0$
c	$(x-3)(x-7)=0$	**i**	$(x-3)(x-2)=0$
d	$(x+2)(x-9)=0$	**j**	$(x+6)(x+3)=0$
e	$(x-7)(x+5)=0$	**k**	$x(x-7)=0$
f	$(x+5)(x-3)=0$	**l**	$(x+1)(x-8)=0$

Q11. Use the quadratic formula to find the roots of the following equations.

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

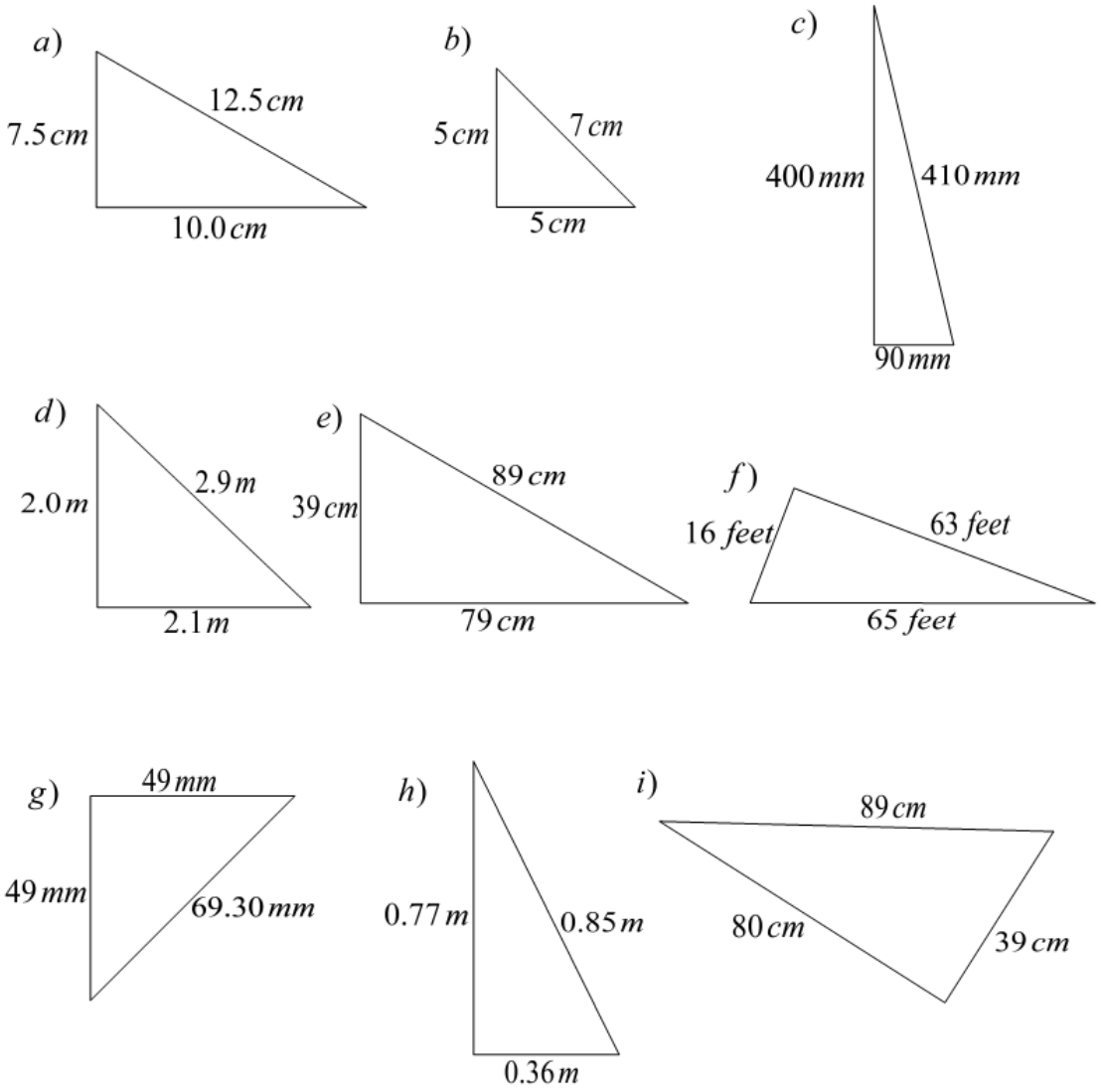
a	$2x^2-5x+1=0$	**g**	$2x^2-3x-4=0$
b	$x^2+7x+5=0$	**h**	$x^2+2x-4=0$
c	$x^2-6x+3=0$	**i**	$x^2+5x+2=0$
d	$x^2-2x-5=0$	**j**	$2x^2-3x-3=0$
e	$2x^2+12x+9=0$	**k**	$3x^2-x-3=0$
f	$5x^2+3x-4=0$	**l**	$3x^2-6x+2=0$

Q12. Use the discriminant to determine the nature of the roots of the following equations

$$b^2-4ac$$

a	$3x^2-7x+2=0$	**g**	$x^2+4x-5=0$
b	$2x^2-3x+4=0$	**h**	$3x^2-6x+3=0$
c	$x^2-6x+9=0$	**i**	$x^2+8x+16=0$
d	$2x^2+x-1=0$	**j**	$x^2-3x+4=0$
e	$7x^2+5x-1=0$	**k**	$3x^2-5x+1=0$
f	$4x^2-7x+3=0$	**l**	$3x^2+x+3=0$

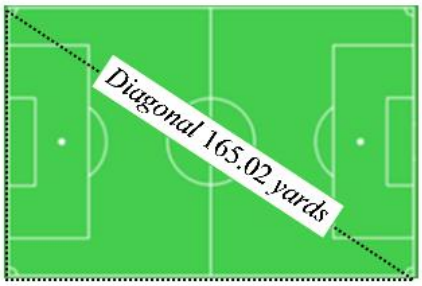
Q13. By using the converse of Pythagoras, identify whether the following triangles are Right Angled.



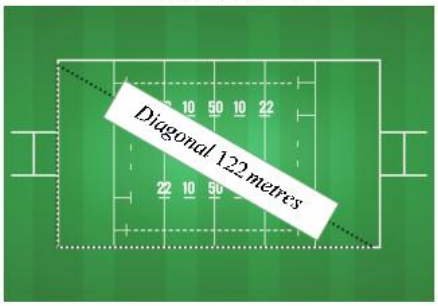
Q14. The converse of pythagoras can be used to ascertain if a sports pitch has been marked out correctly. It is important to make sure that the length and breadth are perpendicular to each other. If the square of the diagonal is $\pm 1\ unit$ of the sum of the square of the 2 shorter sides then it will be within an acceptable tolerance.

Use the dimensions given to find out if the pitches have indeed been marked out correctly.

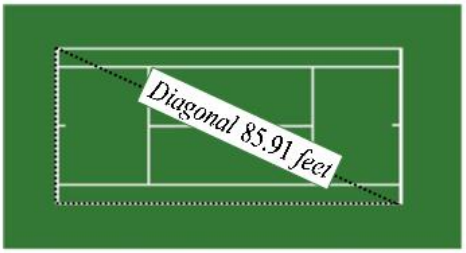
a) Football. Length 130 yards
Breadth 100 yards



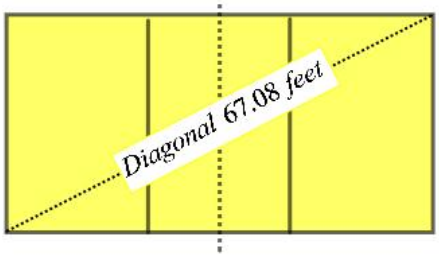
b) Rugby. Length 100 metres
Breadth 70 metres



c) Tennis. Length 78 feet
Breadth 36 feet



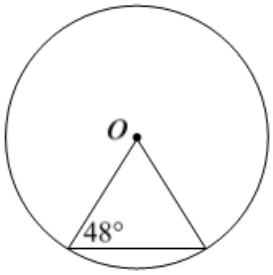
d) Beach Volleyball. Length 60 feet
Breadth 30 feet



R 1.4 Applying geometric skills to lengths, angles and similarity

Q15. Copy the circles below and fill in all of the missing angles.

a)



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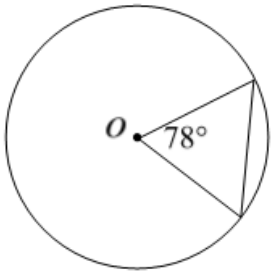

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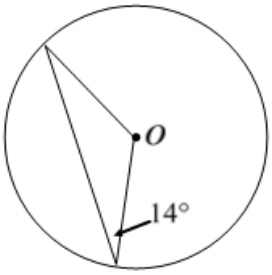

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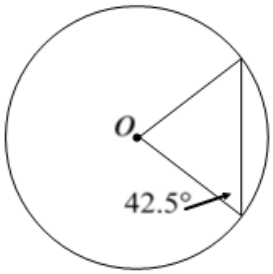

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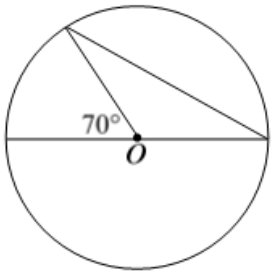

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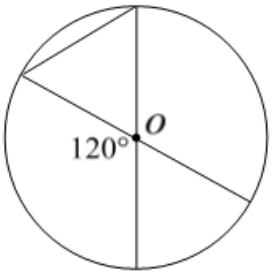

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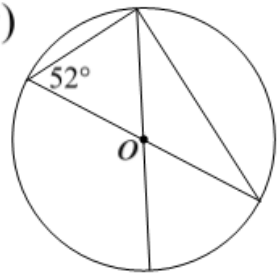

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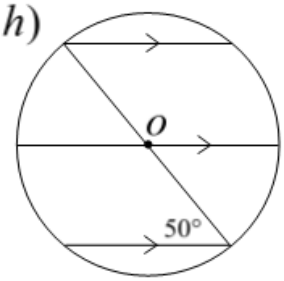

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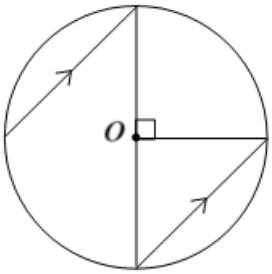
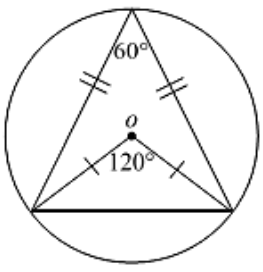


Q16. Copy the circles below and fill in all of the missing angles.

a)



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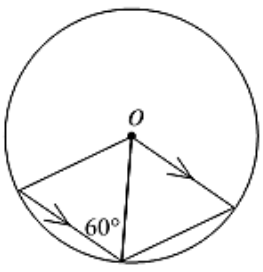
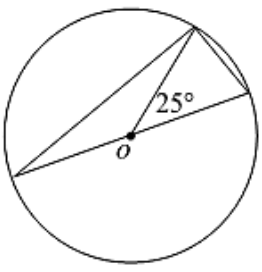
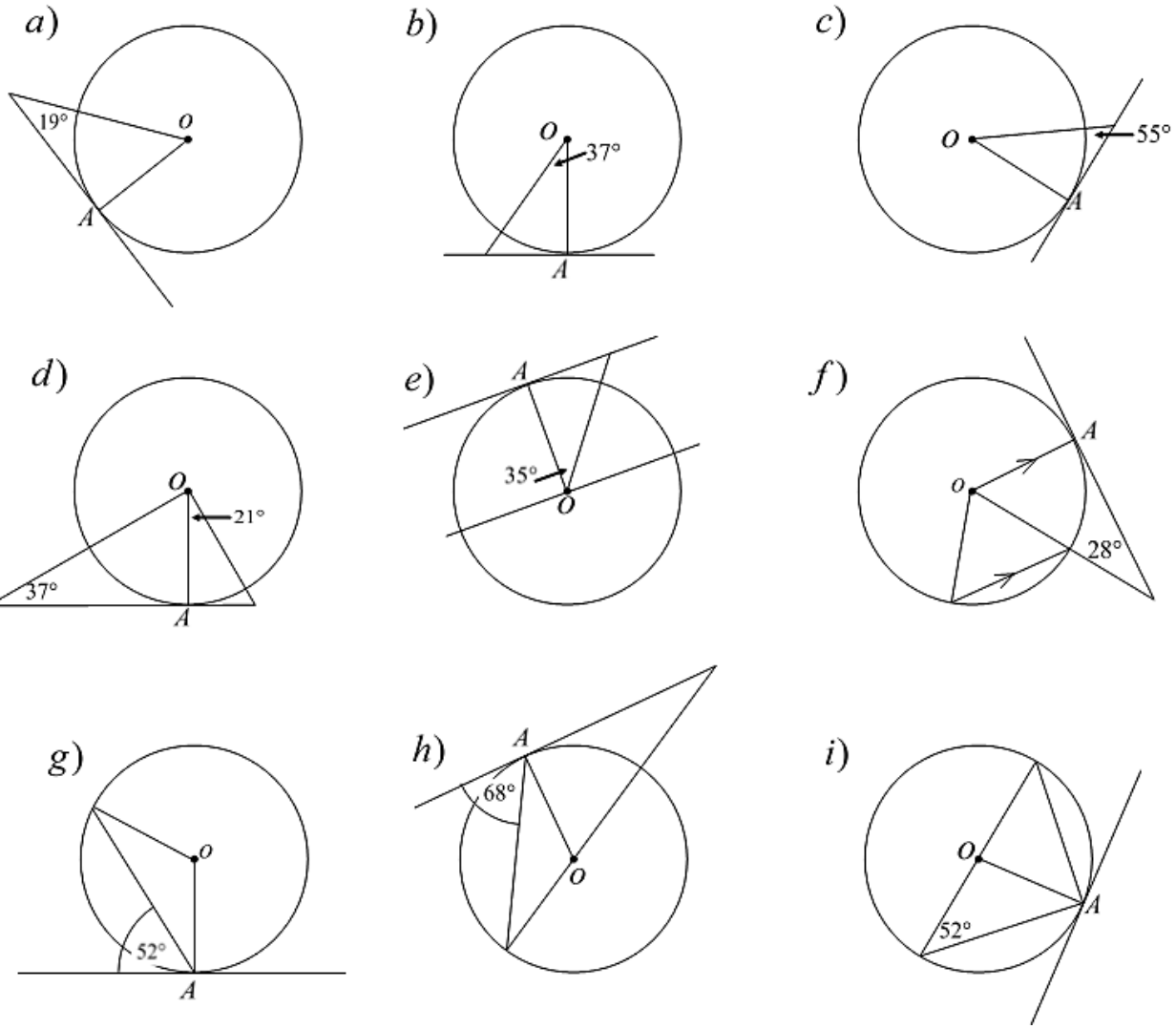


c)



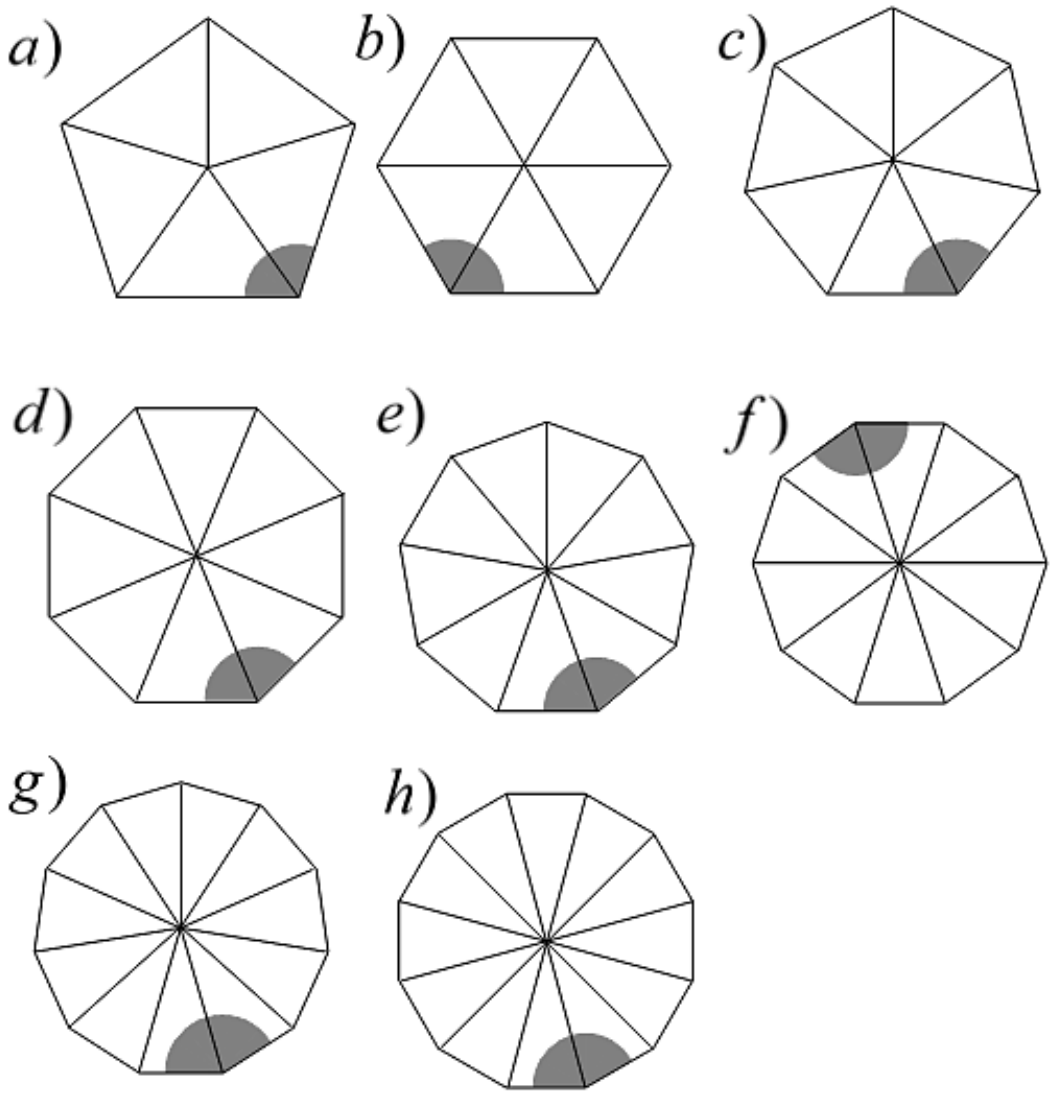
Q17. In each of the examples below, A is the point of contact of the tangent to the circle.

Copy each diagram and fill in the missing angles.



Q18. Each of the following are $n - sided$ regular polygons.

Calculate the size of the shaded angle in each shape.

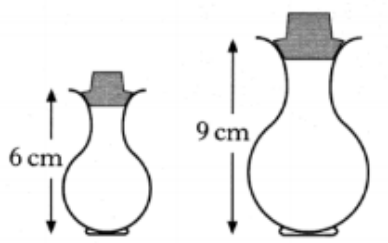


Q19. Copy and complete the table below.

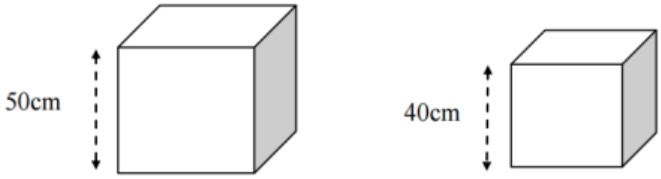
Linear Scale Factor (LSF)	Area Scale Factor (ASF)	Volume Scale Factor (VSF)
2		
	9	
		64
1.5		
	6.25	
		0.015625
$1/3$		
	$2/9$	
		$64/27$
$2\sqrt{2}$		

Q20. Two perfume bottles are mathematically similar in shape. The smaller one is 6 centimetres high and holds 30 millilitres of perfume. The larger one is 9 centimetres high.

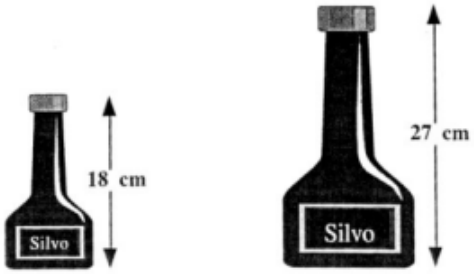
What volume of perfume will the larger one hold.



Q21. The two boxes below are mathematically similar and both have to be wrapped with decorative paper. If it requires 3.27 m2 of paper to cover the large box, calculate the amount of paper needed to cover the smaller box.

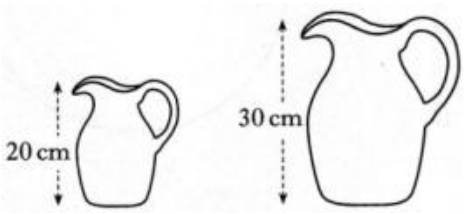


Q22. The diagram shows two bottles of Silvo Shampoo. The two bottles are mathematically similar, and the cost of the shampoo depends only on the volume of liquid in the bottle. If the small one costs 80p, what should the large one cost?

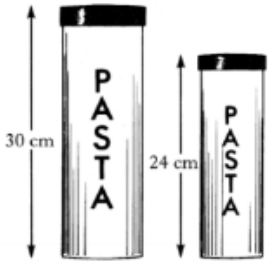


Q23. The diagram shows two jugs which are mathematically similar. The volume of the smaller jug is 0.8 litres.

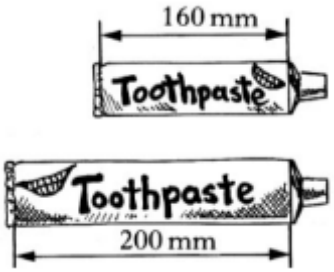
Find the volume of the larger jug.



Q24. The diagram shows two storage jars which are mathematically similar. The volume of the large jar is 1.2 litres. Find the volume of the smaller jar. Give your answer in litres correct to 2 significant figures.



Q25. The diagram shows two tubes of toothpaste. Assuming that the tubes are mathematically similar, and that the price of toothpaste depends only on the volume of toothpaste in the tube, what would be the cost of the large tube when the small one costs £1.12?



R 1.5 Applying trigonometric skills to graphs and identities

Q26. Sketch the following graphs.

a) $y = \sin x$ $\quad 0 \le x \le 360$

b) $y = \cos x$ $\quad 0 \le x \le 360$

c) $y = 3\sin x$ $\quad 0 \le x \le 360$

d) $y = 2\cos x$ $\quad 0 \le x \le 360$

e) $y = -\sin x$ $\quad 0 \le x \le 360$

f) $y = \frac{1}{2}\cos x$ $\quad 0 \le x \le 360$

g) $y = \sin 2x$ $\quad 0 \le x \le 360$

h) $y = \cos 3x$ $\quad 0 \le x \le 120$

i) $y = \sin 4x$ $\quad 0 \le x \le 180$

j) $y = \cos\frac{x}{2}$ $\quad 0 \le x \le 720$

k) $y = \sin x + 1$ $\quad 0 \le x \le 360$

l) $y = \cos x - 2$ $\quad 0 \le x \le 360$

Q27. Sketch the following graphs. (harder)

a) $y = \sin(x + 90)$ $\quad 0 \le x \le 360$

b) $y = \cos(x + 60)$ $\quad 0 \le x \le 360$

c) $y = \sin(x - 30)$ $\quad 0 \le x \le 360$

d) $y = \cos(x + 45)$ $\quad 0 \le x \le 360$

Q28. Find the period of the graph of the following equations.

a) $y = \sin 2x$

b) $y = \cos 3x$

c) $y = \sin 5x$

d) $y = \cos 9x$

e) $y = -\sin 2x$

f) $y = \frac{1}{2}\cos 4x$

g) $y = \sin\frac{1}{2}x$

h) $y = \cos\frac{1}{3}x$

i) $y = \sin\frac{1}{4}x$

j) $y = \cos\frac{x}{2}$

k) $y = \sin\frac{3}{4}x$

l) $y = \cos\frac{2}{3}x$

Q29. Solve the following equations algebraically.

a) $2\sin x = \sqrt{3}$ $\quad 0 \leq x \leq 360$

b) $\sqrt{3}\tan x = 1$ $\quad 0 \leq x \leq 360$

c) $2 = 3\sin x$ $\quad 0 \leq x \leq 360$

d) $2\cos x + \sqrt{3} = 0$ $\quad 0 \leq x \leq 360$

e) $-\sqrt{2}\sin x = 1$ $\quad 0 \leq x \leq 360$

f) $\frac{1}{2}\cos x - \frac{1}{4} = 0$ $\quad 0 \leq x \leq 360$

g) $5\tan x - 9 = 0$ $\quad 0 \leq x \leq 360$

h) $2 - 5\cos x = 0$ $\quad 0 \leq x \leq 360$

i) $4\sin x - 3 = 0$ $\quad 0 \leq x \leq 360$

j) $2\cos x - 1.28 = 0$ $\quad 0 \leq x \leq 360$

k) $0.27 - 3\tan x = 0$ $\quad 0 \leq x \leq 360$

l) $2.4 - 7\cos x = 0$ $\quad 0 \leq x \leq 360$

Answers

Q1.

a	$y = 5 - 3x$	**h**	$3x - 4y - 8 = 0$
b	$y = 2x + 8$	**i**	$5x - 2y - 17 = 0$
c	$y = 5x - 27$	**j**	$2x + 3y + 15 = 0$
d	$y = x - 3$	**k**	$5x + 6y + 30 = 0$
e	$y = 7 - x$	**l**	$4x - 5y - 12 = 0$
f	$y = -2x - 16$	**m**	$11x + 7y + 16 = 0$
g	$x - 2y - 13 = 0$	**n**	$7x - 2y + 5 = 0$

Q2.

a	$b \geq 7$	***b***	$c \geq 13$	***c***	$d > 16$
d	$x > -2$	***e***	$y \leq -6$	***f***	$z > 9$
g	$x > 17$	***h***	$y \leq 0$	***i***	$a > -5$
j	$b \leq 6$	***k***	$c < \frac{-19}{5}$	***l***	$x \geq \frac{17}{2}$
m	$q < -2$	***n***	$r \geq 7$	***o***	$r \geq 4$
p	$p \geq \frac{11}{6}$	***q***	$b \leq 6$	***r***	$d \geq 7$
s	$x > -13$	***t***	$y < -13$	***u***	$z \geq 12$
v	$x \leq -4$	***w***	$m > \frac{7}{3}$	***x***	$n > \frac{29}{5}$

Q3.

a) $\mathrm{A} + 4\mathrm{C} = 26.5$

b) $2\mathrm{A} + 3\mathrm{C} = 32.5$

c) $4\mathrm{C} + 3\mathrm{H} = 29.5$

d) $4\mathrm{D} + 3\mathrm{C} = 22.75$

Q4.

a	$x = -3$	$y = -2$
b	$x = 0$	$y = -1$
c	$x = -3$	$y = 4$
d	$x = 7$	$y = -5$
e	$x = 4$	$y = 6$
f	$x = 4$	$y = 1$
g	$x = -2$	$y = 4$
h	$x = 3$	$y = -3$
i	$x = -2$	$y = -3$
j	$x = 7$	$y = 3$
k	$x = 4$	$y = 0$
l	$x = 1$	$y = 2$

Q5.

a	$r = \pm\sqrt{\frac{3v}{\pi h}}$	**b**	$r = \sqrt[3]{\frac{3v}{4\pi}}$	**c**	$F = \frac{9c}{5} + 32$
d	$h = \frac{c - 20}{25}$	**e**	$b = y - ax$	**f**	$u = v - at$
g	$m = \frac{y - c}{x}$	**h**	$l = \frac{v}{bh}$	**i**	$g = \frac{E}{mh}$
j	$R = \frac{V}{I}$	**k**	$D = \frac{s}{t}$	**l**	$t = \frac{D}{s}$
m	$l = \pm\sqrt{A}$	**n**	$l = \pm\sqrt{\frac{s}{6}}$	**o**	$r = \pm\sqrt{\frac{V}{\pi h}}$
p	$s = \pm\sqrt{\frac{A}{b}}$	**q**	$r = \pm\sqrt{\frac{A}{4\pi}}$	**r**	$A = \frac{p^2}{16}$
s	$h = \frac{2A}{b}$	**t**	$A = 6x^2$	**u**	$V = \pm\sqrt{\frac{2E}{m}}$
v	$E = mC^2$	**w**	$a = \frac{2(s - ut)}{t^2}$	**x**	$k = \frac{4\pi^2 m}{T^2}$

Q6.

a) $k = 4$

b) $k = -1$

c) $k = 3$

d) $k = -5$

e) $k = 2$

f) $k = -4$

g) $k = -2$

h) $k = 5$

i) $k = -3$

Q7.

a) $a = 4$ $b = 1$

b) $a = 2$ $b = -3$

c) $a = 1$ $b = 3$

d) $a = -5$ $b = -5$

e) $a = 1$ $b = -6$

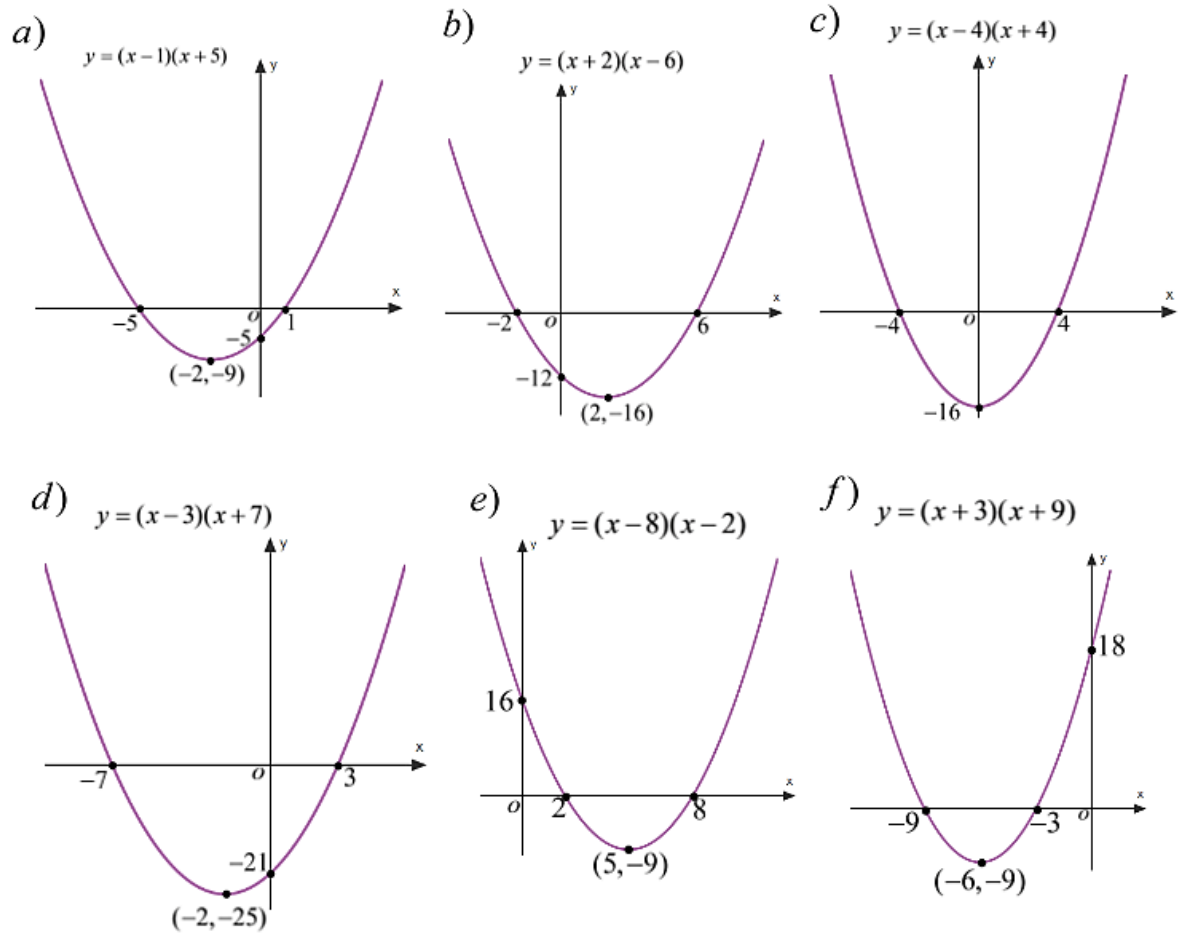
f) $a = -2$ $b = -1$

g) $a = 1$ $b = -4$

h) $a = -3$ $b = 2$

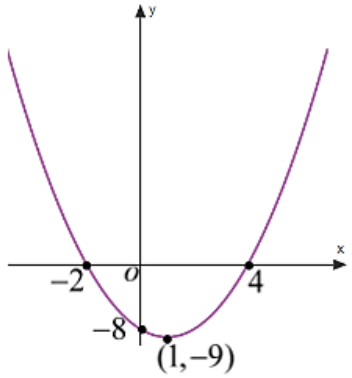
i) $a = 2$ $b = 3$

Q8.

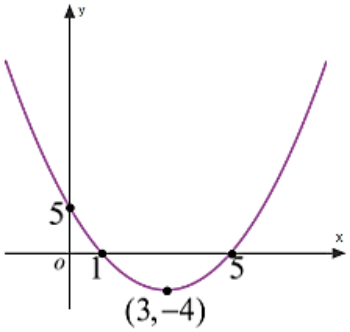


Q8. Continued

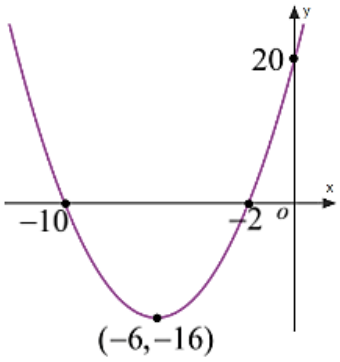
g) $y=(x-4)(x+2)$



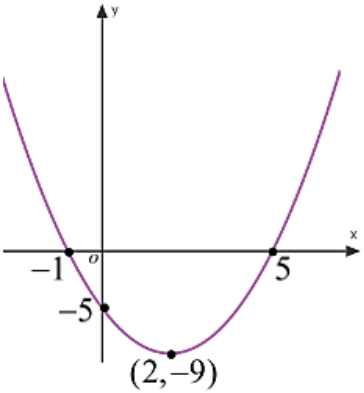
h) $y=(x-5)(x-1)$



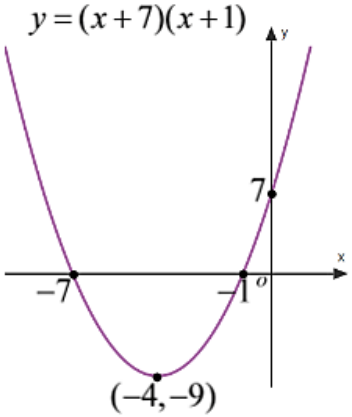
i) $y=(x+2)(x+10)$



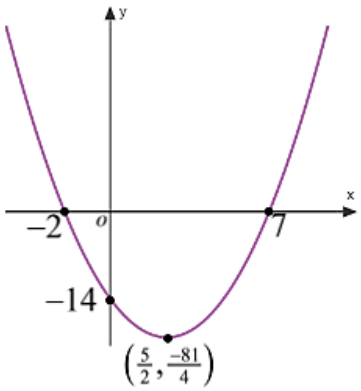
j) $y=(x-5)(x+1)$



k) $y=(x+7)(x+1)$



l) $y=(x-7)(x+2)$



Q9.

a)
i. $x = 1$
ii. $(1,5)$
iii. $Minimum$

b)
i. $x = -4$
ii. $(-4,-3)$
iii. $Minimum$

c)
i. $x = 7$
ii. $(7,4)$
iii. $Maximum$

d)
i. $x = -3$
ii. $(-3,-2)$
iii. $Minimum$

e)
i. $x = 3$
ii. $(3,-3)$
iii. $Minimum$

f)
i. $x = -1$
ii. $(-1,6)$
iii. $Maximum$

g)
i. $x = 1$
ii. $(1,-3)$
iii. $Maximum$

h)
i. $x = -2$
ii. $(-2,2)$
iii. $Minimum$

i)
i. $x = 2$
ii. $(2,-7)$
iii. $Minimum$

j)
i. $x = -3$
ii. $(-3,1)$
iii. $Maximum$

k)
i. $x = 4$
ii. $(4,0)$
iii. $Minimum$

l)
i. $x = 0$
ii. $(0,-4)$
iii. $Maximum$

Q10.

a	$x = 1,$	$x = -2$	**g**	$x = -1,$	$x = -7$
b	$x = -5,$	$x = -4$	**h**	$x = -5,$	$x = 5$
c	$x = 3,$	$x = 7$	**i**	$x = 3,$	$x = 2$
d	$x = -2,$	$x = 9$	**j**	$x = -6,$	$x = -3$
e	$x = 7,$	$x = -5$	**k**	$x = 0,$	$x = 7$
f	$x = -5,$	$x = 3$	**l**	$x = -1,$	$x = 8$

Q11.

a $x = \frac{5 \pm \sqrt{17}}{4}$

b $x = \frac{-7 \pm \sqrt{29}}{2}$

c $x = 3 \pm \sqrt{6}$

d $x = 1 \pm \sqrt{6}$

e $x = \frac{-6 \pm 3\sqrt{2}}{2}$

f $x = \frac{-3 \pm \sqrt{89}}{10}$

g $x = \frac{3 \pm \sqrt{41}}{4}$

h $x = -1 \pm \sqrt{5}$

i $x = \frac{-5 \pm \sqrt{17}}{2}$

j $x = \frac{3 \pm \sqrt{33}}{4}$

k $x = \frac{1 \pm \sqrt{37}}{6}$

l $x = \frac{3 \pm \sqrt{3}}{3}$

Q12.

a	$b^2 - 4ac = 25$	*two real and distinct roots*
b	$b^2 - 4ac = -23$	*no real roots*
c	$b^2 - 4ac = 0$	*real and equal roots*
d	$b^2 - 4ac = 9$	*two real and distinct roots*
e	$b^2 - 4ac = 53$	*two real and distinct roots*
f	$b^2 - 4ac = 1$	*two real and distinct roots*
g	$b^2 - 4ac = 36$	*two real and distinct roots*
h	$b^2 - 4ac = 0$	*real and equal roots*
i	$b^2 - 4ac = 0$	*real and equal roots*
j	$b^2 - 4ac = -7$	*no real roots*
k	$b^2 - 4ac = 13$	*two real and distinct roots*
l	$b^2 - 4ac = -35$	*no real roots*

Q13.

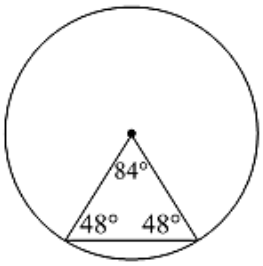
	Sum of the square of the 2 shorter sides	Square of the Diagonal	
a	156.25	156.25	Yes it is a right angled triangle
b	50	49	No it is not a right angled triangle
c	168100	168100	Yes it is a right angled triangle
d	8.41	8.41	Yes it is a right angled triangle
e	7762	7921	No it is not a right angled triangle
f	4225	4225	Yes it is a right angled triangle
g	4802	4802.49	No it is not a right angled triangle
h	0.7225	0.7225	Yes it is a right angled triangle
i	7921	7921	Yes it is a right angled triangle

Q14.

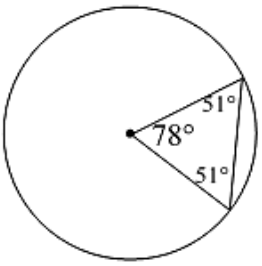
	Sum of the square of the 2 shorter sides	Square of the Diagonal	
a	26900	27231.6004	No it is out with the acceptable tolerance
b	14900	14884	No it is out with the acceptable tolerance
c	7380	7380	Yes it is within the acceptable tolerance
d	4500	4499.7264	Yes it is within the acceptable tolerance

Q15.

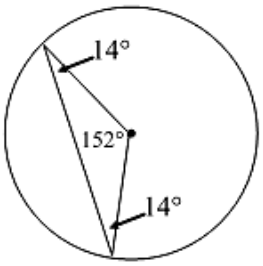
a)



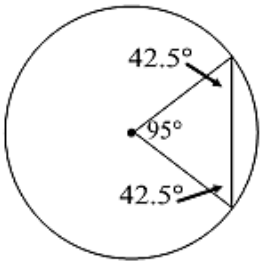
b)



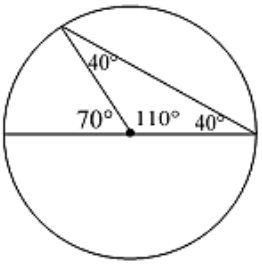
c)



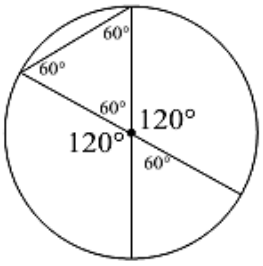
d)



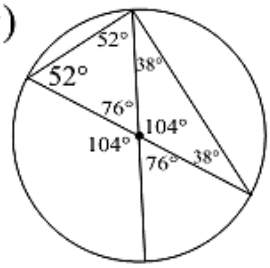
e)



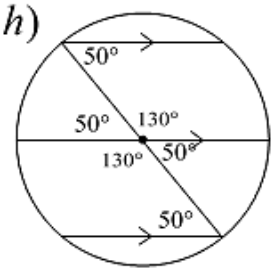
f)



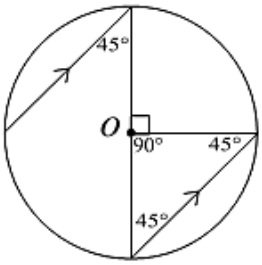
g)



h)

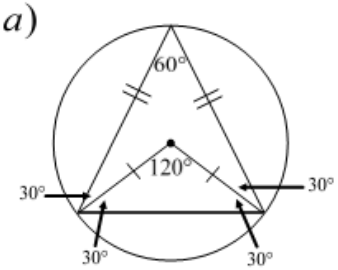


i)

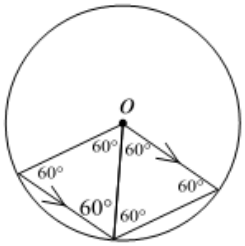


Q16.

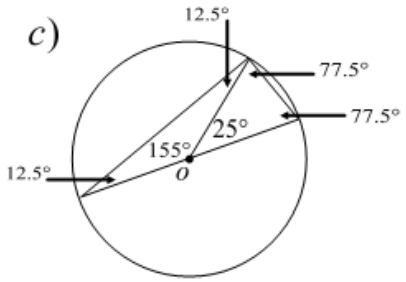
a)



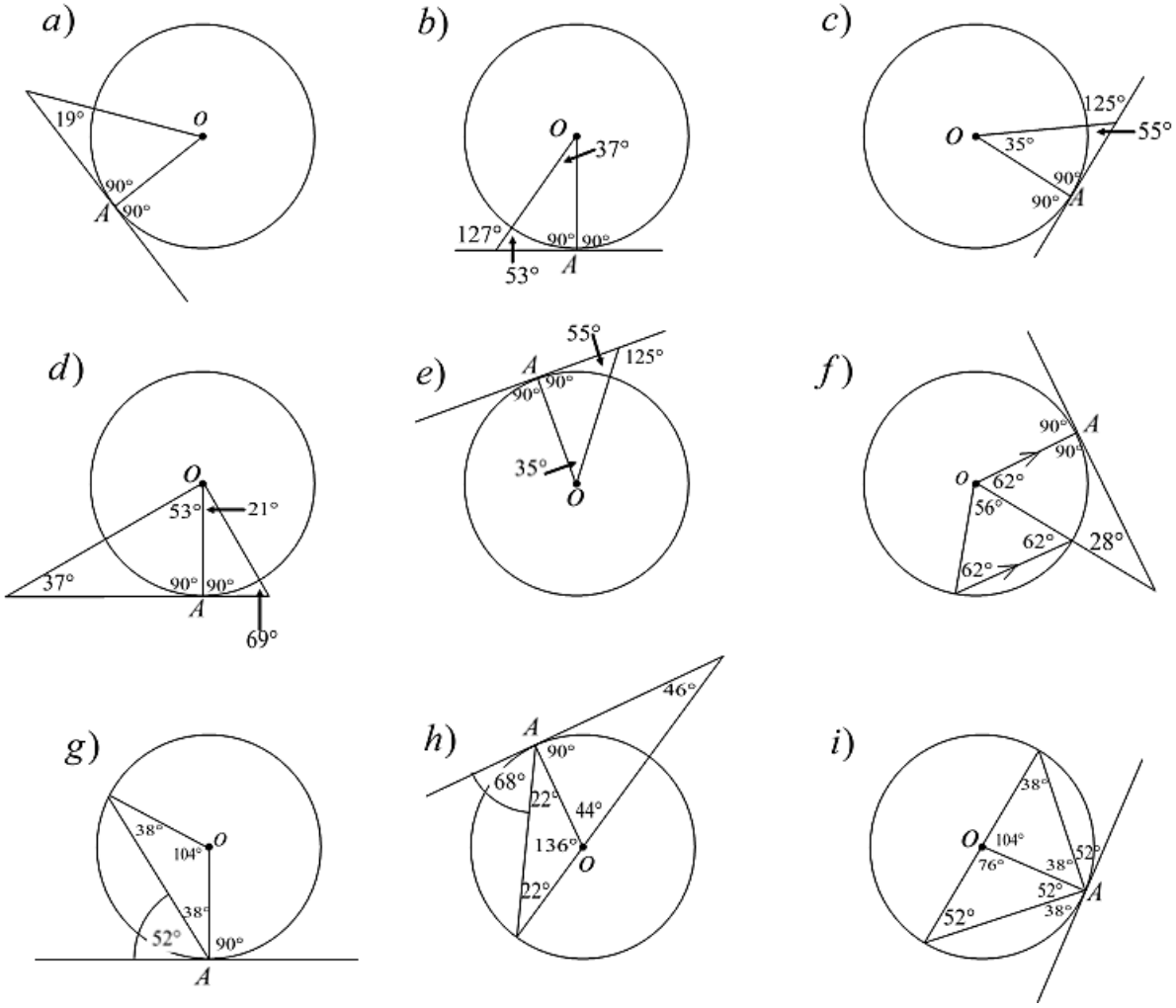
b)



c)



Q17.



Q18.

a	108°	**e**	140°
b	120°	**f**	144°
c	128.5714 … °	**g**	147.2727 … °
d	135°	**h**	150°

Q19.

Linear Scale Factor (LSF)	Area Scale Factor (ASF)	Volume Scale Factor (VSF)
2	4	8
3	9	27
4	16	64
1.5	2.25	3.375
2.5	6.25	15.625
0.25	0.0625	0.015625
$^1/_3$	$^1/_9$	$^1/_{27}$
$^{\sqrt{2}}/_3$	$^2/_9$	$^{2\sqrt{2}}/_{27}$
$^4/_3$	$^{16}/_9$	$^{64}/_{27}$
$2\sqrt{2}$	8	$16\sqrt{2}$

Q20. 101.25 ml

Q21. 2.0928 m^2

Q22. £2.70

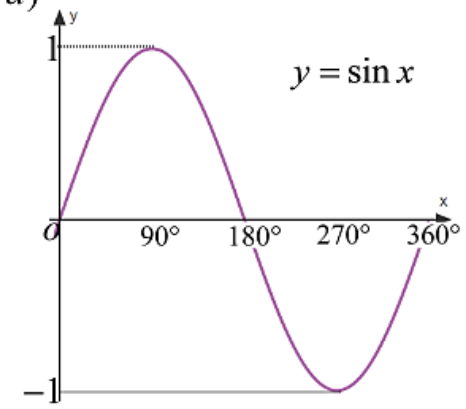
Q23. 2.7 $litres$

Q24. 0.61 $litres$

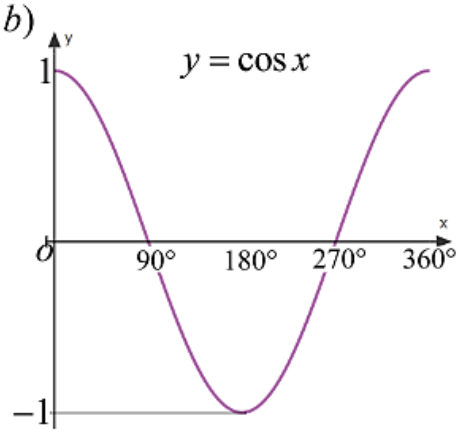
Q25. £2.19

Q26.

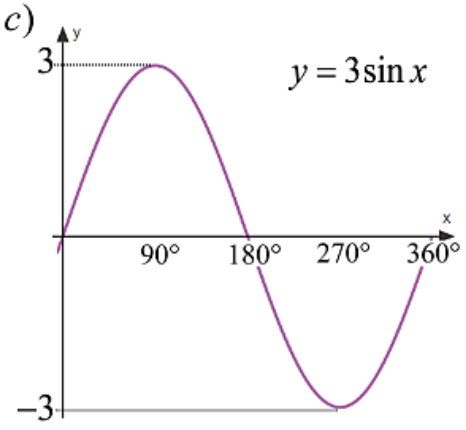
a)


y
1
y = sin x
x
o
90°
180°
270°
360°
−1

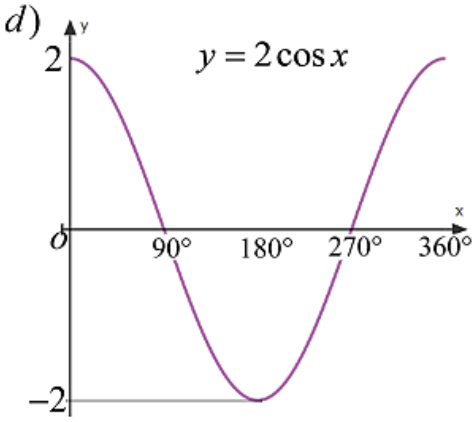
b)


y
1
y = cos x
x
o
90°
180°
270°
360°
−1

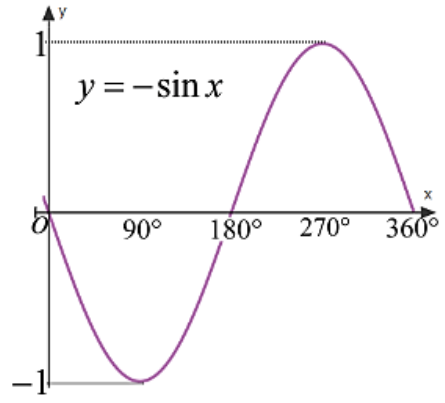
c)


y
3
y = 3sin x
x
90°
180°
270°
360°
−3

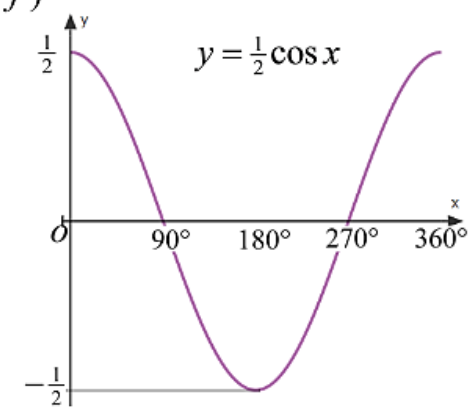
d)


y
2
y = 2cos x
x
o
90°
180°
270°
360°
−2

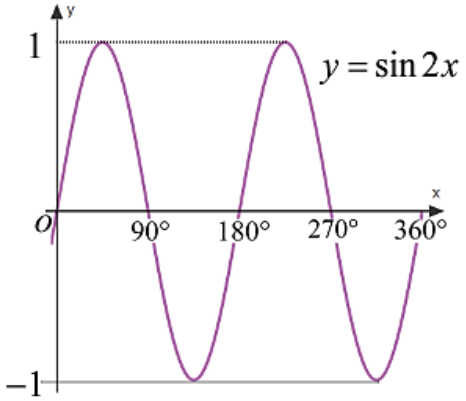
e)


y
1
$y = -\sin x$
x
o
90°
180°
270°
360°
−1

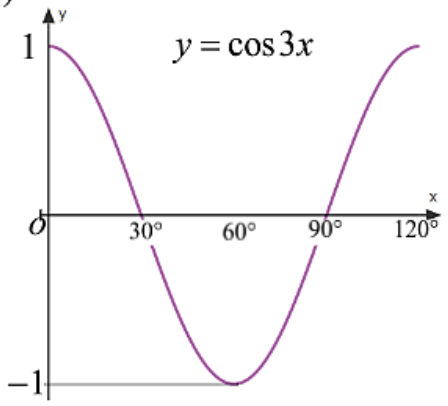
f)


y
$\frac{1}{2}$
$y = \frac{1}{2}\cos x$
x
o
90°
180°
270°
360°
$-\frac{1}{2}$

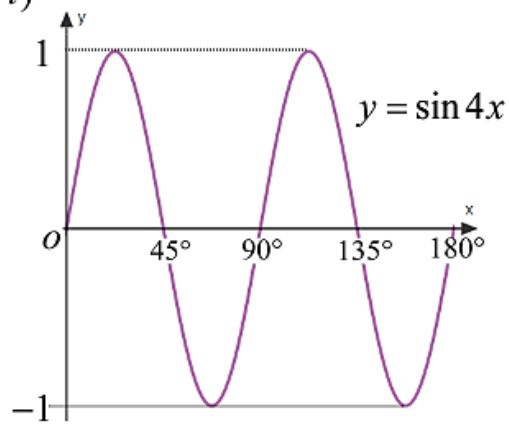
g)


y
1
$y = \sin 2x$
x
o
90°
180°
270°
360°
−1

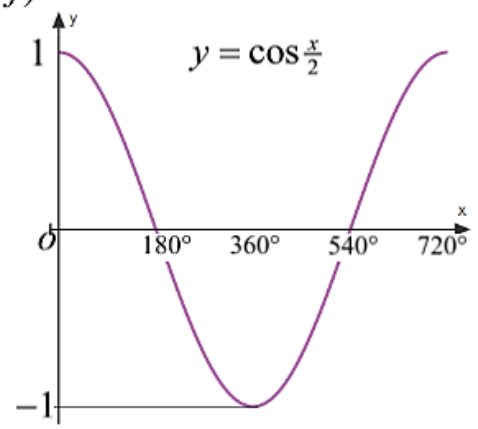
h)


y
1
$y = \cos 3x$
x
o
30°
60°
90°
120°
−1

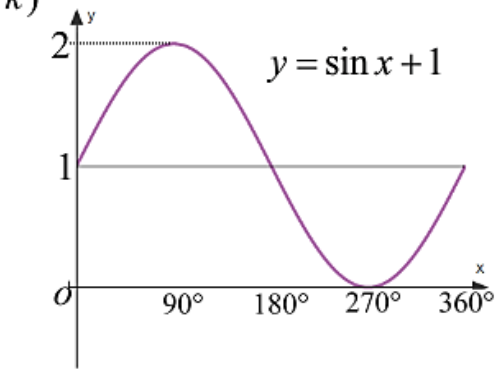
i)


y
1
$y = \sin 4x$
x
o
45°
90°
135°
180°
−1

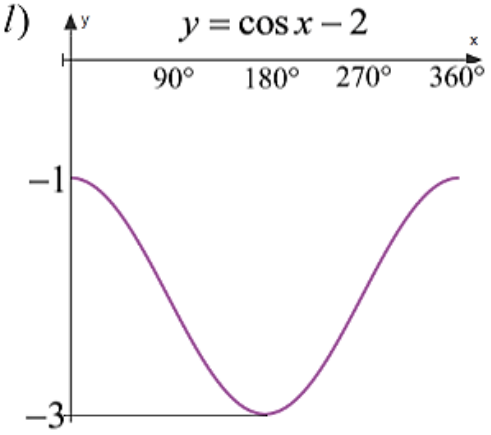
j)


y
1
$y = \cos \frac{x}{2}$
x
o
180°
360°
540°
720°
−1

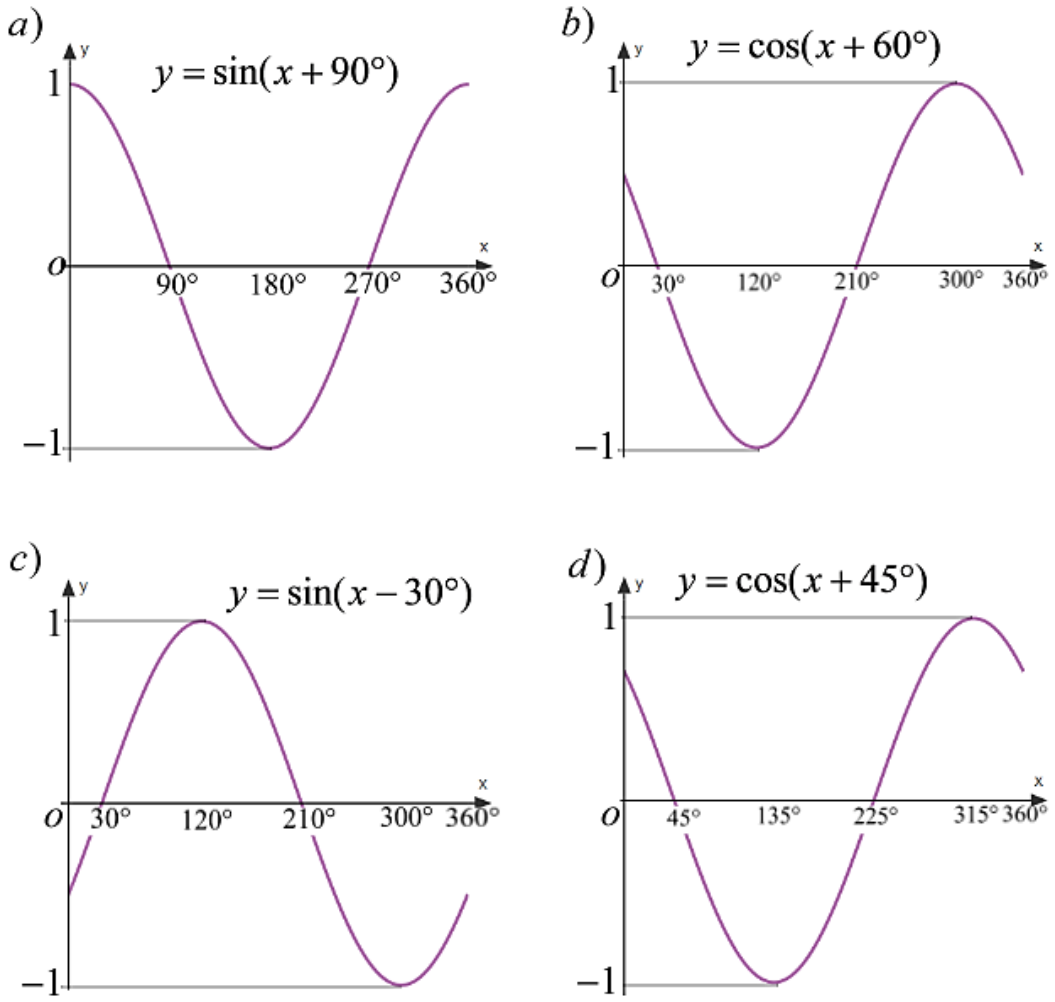
k)


y
2
$y = \sin x + 1$
1
x
o
90°
180°
270°
360°

l)


y
$y = \cos x - 2$
x
90°
180°
270°
360°
−1
−3

Q27.



Q28.

a	180°	**g**	720°
b	120°	**h**	1080°
c	72°	**i**	1440°
d	40°	**j**	720°
e	180°	**k**	480°
f	90°	**l**	540°

Q29.

a	$x = 60°, 120°$	**g**	$x = 60.9453\ldots°, 240.9453\ldots°$
b	$x = 30°, 210°$	**h**	$x = 66.4218\ldots°, 293.5781\ldots°$
c	$x = 41.8103\ldots°, 138.1896\ldots°$	**i**	$x = 48.5903\ldots°, 131.4096\ldots°$
d	$x = 150°, 210°$	**j**	$x = 50.2081\ldots°, 309.7918\ldots°$
e	$x = 225°, 315°$	**k**	$x = 5.1427\ldots°, 185.1427\ldots°$
f	$x = 60°, 300°$	**l**	$x = 69.9489\ldots°, 290.0510\ldots°$