



SPTA

Unit Revision Relationships



Show all working – Calculator allowed.

1. Find the equation of the straight line with the following gradient and passing through the points:

- a) $m = 2$ (4, 5) (b) $m = 3$ (-1, 2) (c) $m = -3$ (3, -5)
d) $m = -1$ (-2, -4) (e) $m = 4$ (2, -1) (f) $m = -4$ (-3, -2)

2. Solve these inequalities:

- a) $5x + 3 < 3x + 11$ (b) $4y - 4 \geq y + 5$ (c) $3w + 5 > w - 3$
d) $8k - 1 \leq 3k - 11$ (e) $7x - 2 > 3x + 10$ (f) $6x + 10 \geq x - 5$
g) $6x + 2 < 3x + 26$ (h) $6m + 2 \leq 4m + 10$

3. Write an equation to represent each of these:

- a) Two fish suppers and three sausage suppers cost £13
b) Three adult tickets and 4 child tickets for a concert cost £75
c) Mr & Mrs Dean take their three children to a theme park. The total cost of the tickets is £88

4. Solve each of these systems of equations:

- a) $4x + 3y = 17$ (b) $6m - 4n = 10$ (c) $3a + 3b = 29$
 $5x - y = 7$ $5m + n = 4$ $4a + 3b = 24$

5. Mrs Benson bought five fish suppers and two pie suppers for £10.20.

Mr Brown bought three fish suppers and seven pie suppers for £12.50.

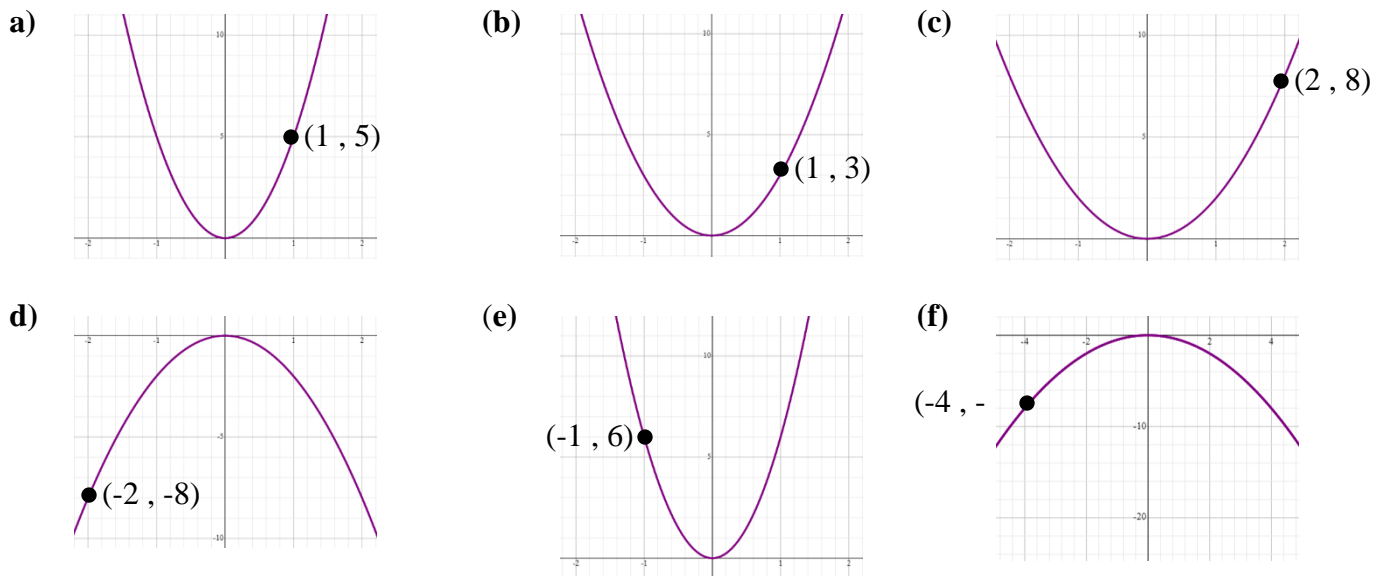
How much did it cost Mrs Forrest to buy four fish suppers and three pie suppers?

6. Brian, Molly and their four children visit Waterworld. The total cost of their tickets is £56
 Sarah and her three children also visit Waterworld. The total cost of their tickets is £36
 How much will it cost peter and his two children to go to Waterworld?

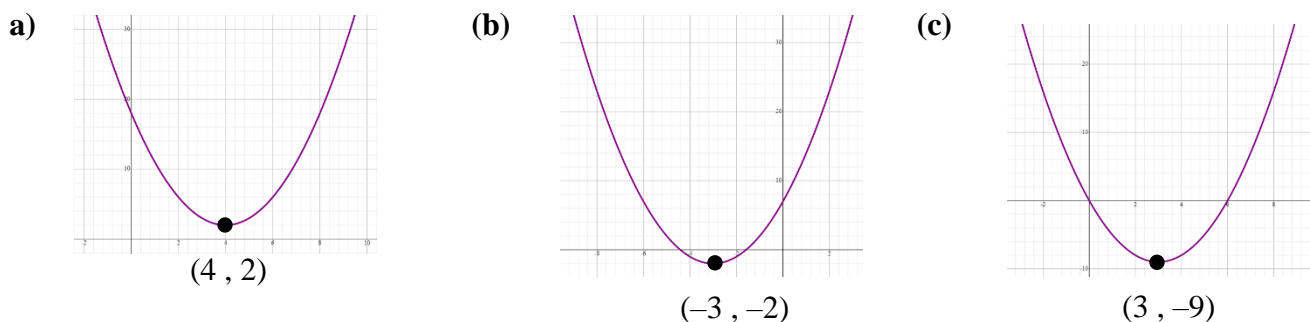
7. Change the subject of each formula to x:

- a) $y = 2x + p$ (b) $p = u + vx$ (c) $n = 2mx$ (d) $y = \frac{7x}{8} - 2$
 e) $a = \frac{6x}{5} + 10$ (f) $m = 3(2x + 1)$ (g) $h = 4(5x - 3)$ (h) $d = \frac{5x}{2} - 3$
 i) $c = 4ax + 5$

8. Each diagram below shows parabolas with equations $y = kx^2$. For each find k:

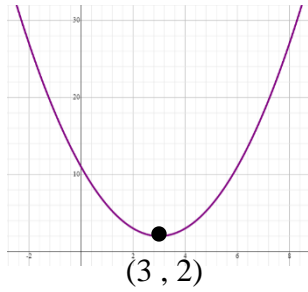


9. Each of the parabolas below are in the form $y = (x - a)^2 + b$. Find the values of a and b



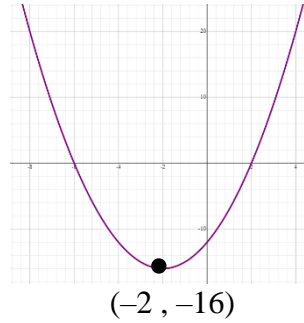
10. Find the values of a & b for each diagram below:

a)



$$y = (x + a)^2 + b$$

(b)



$$y = (x + a)^2 - b$$

11. For each parabola find the following:

i) The equation of the axis of symmetry.

(a) $y = (x - 4)^2 - 3$

(e) $y = (x + 2)^2 - 6$

ii) The coordinates of the Turning Point.

(b) $y = (x + 2)^2 + 5$

(f) $y = (x + 3)^2 + 1$

iii) The nature of the TP

(c) $y = (x - 2)^2 + 3$

(g) $y = (x + 5)^2 - 8$

(d) $y = (x - 1)^2 + 3$

(h) $y = (x - 6)^2 + 3$

12. Sketch the graph of each of these on plain paper.

Each graph must show clearly the intersections with the axis and the turning point.

a) $y = (x - 4)(x - 6)$

(b) $y = (x + 4)(x - 6)$

(c) $y = (x - 4)(x + 8)$

d) $y = (x + 2)(x + 6)$

(e) $y = (x + 4)(x - 8)$

(f) $y = (x - 5)(x + 3)$

13. Solve each of these equations:

a) $(x - 5)(x - 7) = 0$

(b) $(x + 2)(x - 3) = 0$

(c) $(x - 5)(x + 1) = 0$

d) $(x + 4)(x + 6) = 0$

(e) $(x + 6)(2x - 4) = 0$

(f) $(2x + 6)(x + 6) = 0$

g) $(x - 7)(3x + 6) = 0$

(h) $(x - 6)(2x - 2) = 0$

14. Solve these equations correct to 2 decimal places:

a) $x^2 + 7x + 3 = 0$

(b) $x^2 - x - 5 = 0$

(c) $x^2 - 10x - 5 = 0$

d) $2x^2 + 12x + 9 = 0$

- 15. a)** A rocket is launched upwards from the top of a wall 2 metres high. The height of the rocket is given by the formula $h = -4t^2 + 10t + 2$, where h is the height above the ground in metres at time t seconds. How long will it take the rocket to hit the ground?
- b)** A missile is fired upwards from the top of a tower 15 metres high. The height of the missile is given by the formula $h = -2t^2 + 20t + 15$, where h is the height above the ground in metres at time t seconds. How long will it take the missile to hit the ground?
- c)** A ball is thrown upwards from the top of a building 7 metres high. The height of the ball is given by the formula $h = -3t^2 + 18t + 7$, where h is the height above the ground in metres at time t seconds. How long will it take the ball to hit the ground?

16. Determine the Nature of the roots for each of these:

a) $x^2 + 8x + 16 = 0$

(b) $x^2 - 3x + 4 = 0$

(c) $x^2 - 6x + 9 = 0$

d) $x^2 + 8x - 3 = 0$

(e) $x^2 + 4x - 5 = 0$

(f) $x^2 + 3x + 7 = 0$

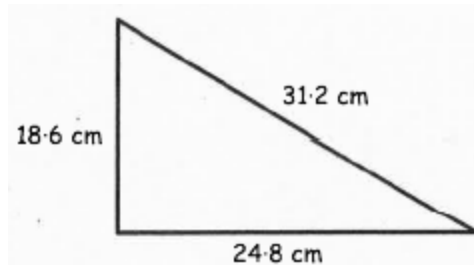
g) $3x^2 - 7x + 2 = 0$

(h) $2x^2 + 3x - 4 = 0$

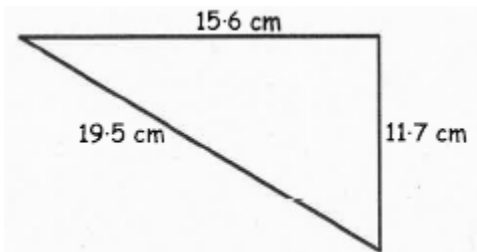
(i) $2x^2 - 4x + 2 = 0$

g) $3x^2 - 5x + 3 = 0$

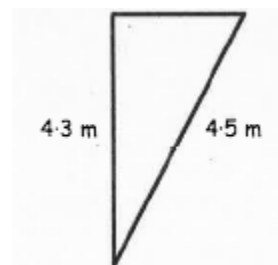
17. Is this triangle Right angled?



18.



A joiner is making a Right angled shelf to fit in the corner of a room. He cuts the triangle shown here. Has he been successful?



19. The perimeter of a Traffic Island is 10.4 metres.

The Island is shown in this diagram

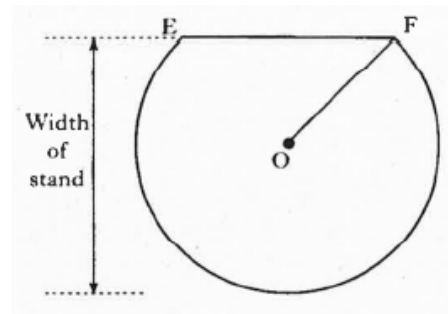
Is the Island a Right angled triangle?

20. The diagram shows the base of speaker stand.

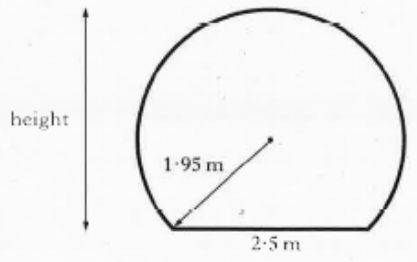
The centre of the circle is O and EF is a chord with length 18cm

The radius of the circle, OF, is 15cm

Find the width of the stand.



- 21.



The diagram shows the cross section of a tunnel.

The radius of the circle is 1.95m and the width of the base is 2.5m.

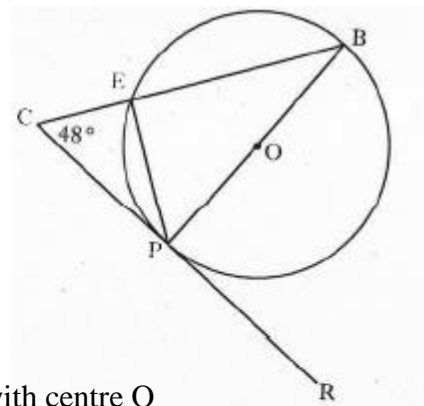
For safety reasons the height of the tunnel must be at least 5.5m.

Does the tunnel meet the safety regulations? Explain fully.

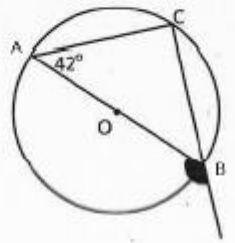
22. A circle centre O is shown. PB is the diameter.

CR is a tangent to the circle at point P.

Angle BCP is 48° , calculate the size of angle EPR



- 23.



The diagram shows a circle with centre O and diameter AB. C is a point on the circle.

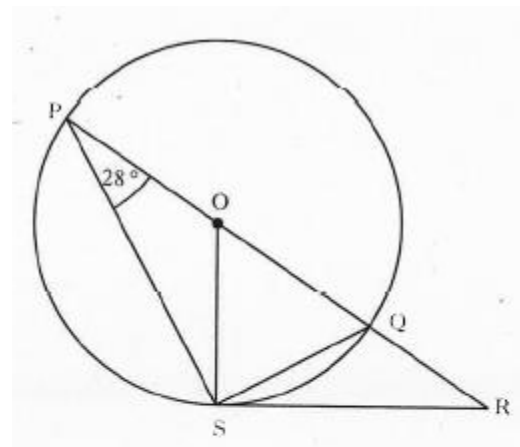
Calculate the size of the shaded angle.

24. A circle centre O is shown. PQ is the diameter.

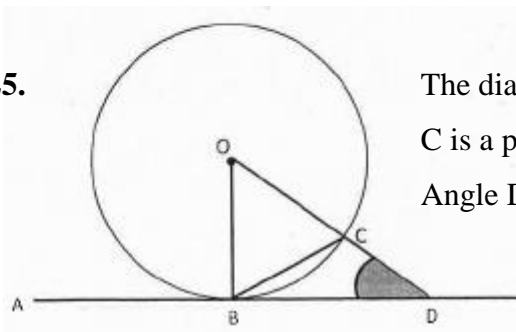
RS is a tangent to the circle at point S.

PQR is a straight line.

Angle OPS is 28° , calculate the size of angle QRS



- 25.



The diagram shows a circle with centre O

C is a point on the circle. AD is a tangent to the circle at B

Angle DBC is 34° . Calculate the size of the shaded angle.

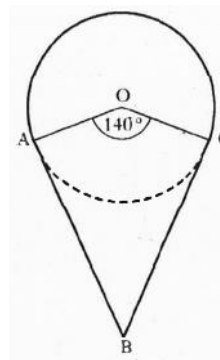
26. Kite OABC and a circle with centre O are shown.

AB is a tangent to the circle at A.

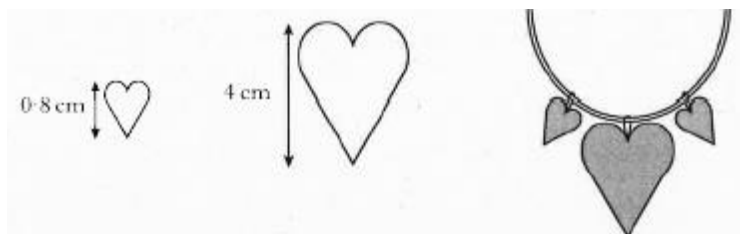
BC is a tangent to the circle at C.

Given that angle AOC is 140°

Calculate angle ABC.



- 27.



A necklace is made up of Mathematically similar heart shaped beads.

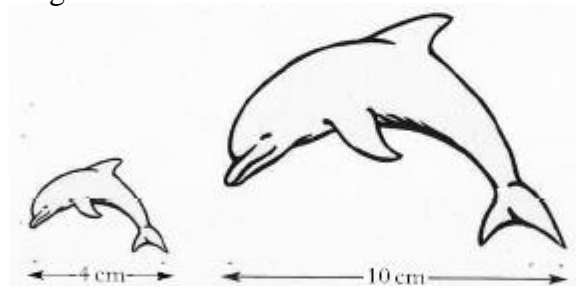
The height of the smaller heart is 0.8cm and its area is 0.6cm^2

Find the area of the large heart if its height is 4cm.

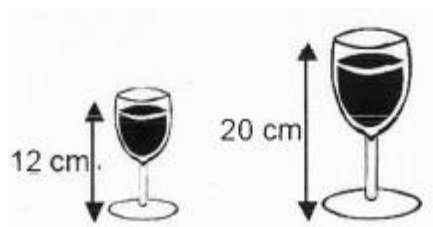
28. Two fridge magnets are Mathematically similar.

The smaller magnet is 4cm long and the larger is 10cm.

The area of the smaller magnet is 18cm^2 , find the larger area.



- 29.



These wine glasses are Mathematically similar.

The smaller glass holds 135ml of wine.

How much will the larger glass hold?

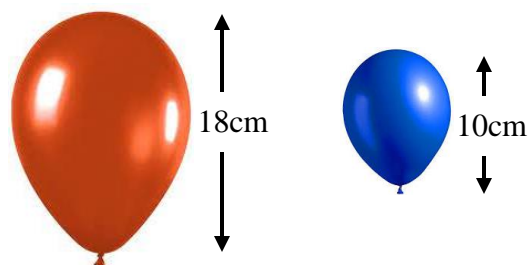
30. Two metal pipes are Mathematically similar.

The smaller pipe has a volume of 8000cm^3

What is the volume of the larger pipe?



- 31.

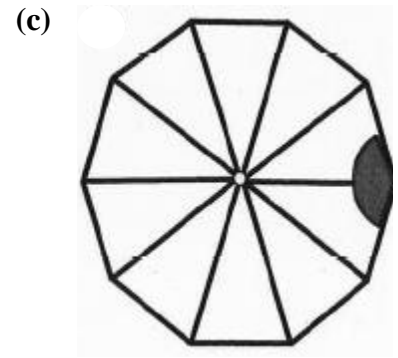
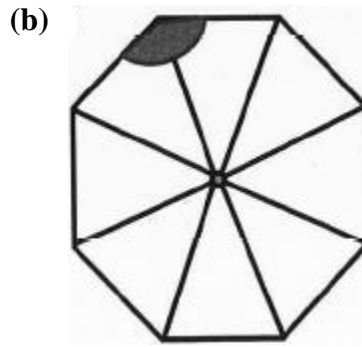
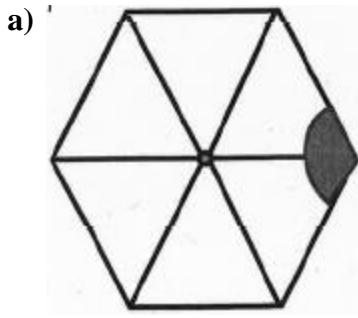


Two balloons are Mathematically similar in shape.

The larger balloon has a volume of 2187cm^3 .

What volume does the smaller balloon have?

32. Calculate the size of the shaded angles in each polygon below:



32. Sketch the graph of the following, $0^\circ \leq x^\circ \leq 360^\circ$:

a) $y = 2\sin x^\circ$

(b) $y = 4\sin x^\circ$

(c) $y = 2\cos x^\circ$

d) $y = 3\cos x^\circ$

(e) $y = 6\sin x^\circ$

(f) $y = 10\cos x^\circ$

33. Write down the period and amplitude of:

a) $y = \sin 3x^\circ$

(b) $y = \cos 3x^\circ$

(c) $y = \sin 4x^\circ$

d) $y = \cos 6x^\circ$

(e) $y = 2\sin 3x^\circ$

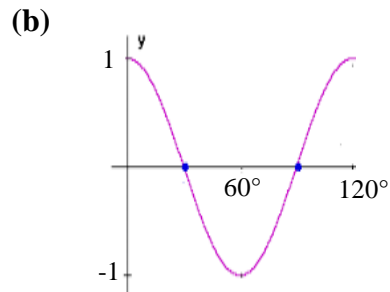
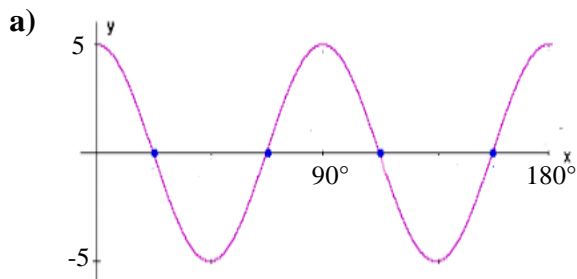
(f) $y = 4\cos 2x^\circ$

g) $y = 6\sin 10x^\circ$

(h) $y = 3\sin 4x^\circ$

(i) $y = 7\cos 6x^\circ$

34. The graphs below both have equations in the form $y = a\cos bx^\circ$. State the values of a & b.



35. Solve the equations, $0^\circ \leq x^\circ \leq 360^\circ$:

a) $10\sin x^\circ - 1 = 0$

(b) $5\cos x^\circ + 2 = 0$

(c) $6\sin x^\circ + 1 = 0$

d) $2\tan x^\circ - 7 = 0$

(e) $10\cos x^\circ - 2 = 0$

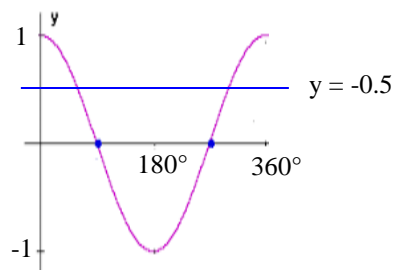
(f) $9\sin x^\circ + 6 = 2$

g) $3\cos x^\circ + 6 = 8$

36. The diagram shows the graph of $y = \cos x^\circ$.

The line, $y = -0.5$ cuts the graph at points B & C

Find the x-coordinates of B and C.

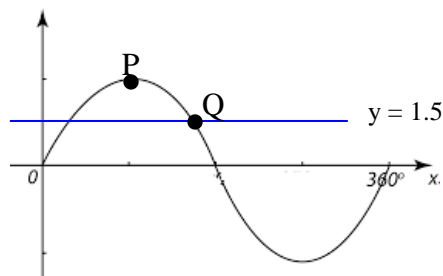


37. The diagram shows the graph of $y = 2\sin x^\circ$.

a) Write down the coordinates of point P

The line, $y = 1.5$ cuts the graph at 2 points

Find the x-coordinates of Q.



38. Part of the graph of $y = 1 + \sin x^\circ$ is shown.

The line with equation $y = 1.7$ is drawn also.

It cuts the graph of $y = 1 + \sin x^\circ$ at points A & B.

Find the x-coordinates of A and B

