MATHEMATICS

N5

Final Exam Revision Questions

Sheets 7 – 12

FORMULAE LIST

The roots of $ax^2+bx+c=0$ 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: $a^2=b^2+c^2-2bc\cos A$ or $\cos A=\dfrac{b^2+c^2-a^2}{2bc}$

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

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: $s=\sqrt{\dfrac{\sum(x-\bar{x})^2}{n-1}}=\sqrt{\dfrac{\sum x^2-\left(\sum x\right)^2/n}{n-1}}$

where n is the sample size

Sheet 7

Unit 1 Expressions and Formulae

Q1-8 non-calculator

1. (a) Simplify $\sqrt{48}+\sqrt{108}$ (b) Rationalise the denominator $\frac{3}{\sqrt{5}}$

2. Evaluate $9^{\frac{3}{2}}-4^{-2}$

3. Work out $6\times10^5 \times 181$. Write your answer in scientific notation.

4. Simplify

   (a) $(3x-4)(3x+1)$ (b) $(x-4)(2x^2-4x+1)$

5. Solve the following equations

   (a) $18x^2-9x=0$ (b) $x^2-49=0$ (c) $x^2+4x-21=0$

6. Express $y=x^2+6x-2$ in the form $y=(x+a)^2+b$

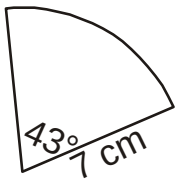
7. Simplify $\frac{x^2-25}{x^2+7x+10}$

8. Find the gradient of the line joining A(4, 2) to B(0, 5).

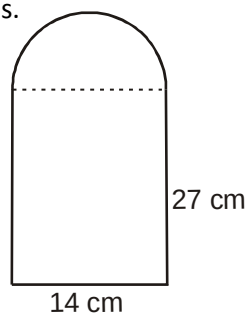
9. Find the area and perimeter of the following shapes.

Give your answer correct to 2 significant figures.

(a)

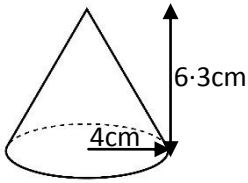


(b)

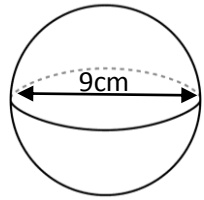


10. Calculate the volume of the following shapes

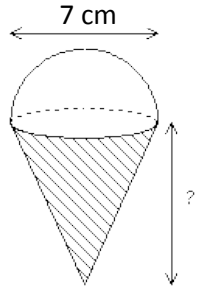
(a)



(b)



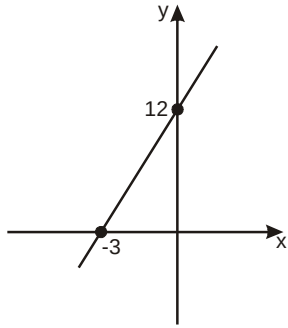
11. If the volume of the following shape is 621 cm^3 calculate the height of the cone



Unit 2 Relationships

Q12-19 non-calculator

12. Find the equation of this straight line



13. Solve the following:

(a) $18-3(2x-4)=12$ (b) $3x+7<5x-2$

14. (a) A man buys 2 CDs and 5 DVDs from a shop and the cost is £52. Write down an equation for this.

(b) A woman buys 9 CDs and 4 DVDs from the same shop and the cost is £86. Write an equation for this.

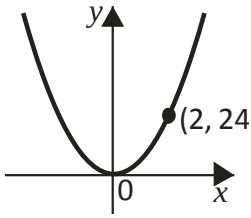
(c) Find, algebraically, the cost of a CD and a DVD.

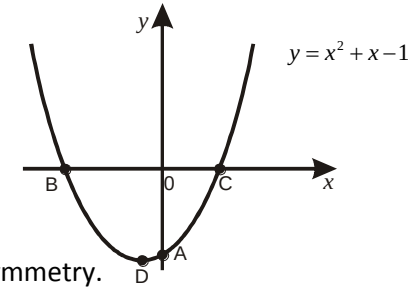
15. Change the subject of the formula $p=rqt^2$ to t

16. (a) Find the roots of $y=x^2+4x+3$ and hence sketch its graph.

(b) Express $y=x^2-4x+7$ in the form $y=(x+a)^2+b$ and hence sketch its graph.

17. The parabola is in the form $y=kx^2$. What is the value of k ?





18. (a) Find the coordinates of A.

(b) Find the coordinates of B and C.

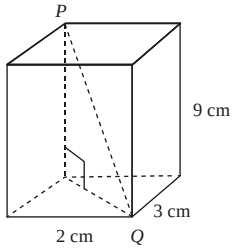
(c) State the equation of the axis of symmetry.

(d) Find the coordinates of the turning point D.

19. (a) Find the discriminant and the nature of the roots of $3x^2 + 4x - 2 = 0$.

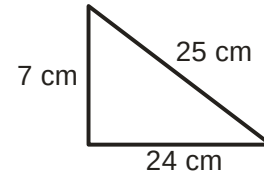
(b) Find the value(s) of p for which the equation $x^2 - 2px + 25 = 0$ has only one real root. ($p \neq 0$)

20. (a) Work out the length of PQ

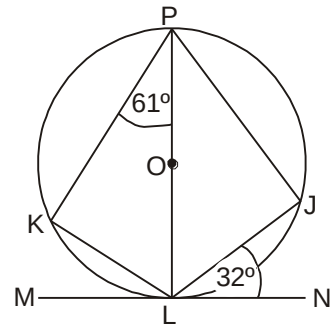


(b) Is this triangle right angled?

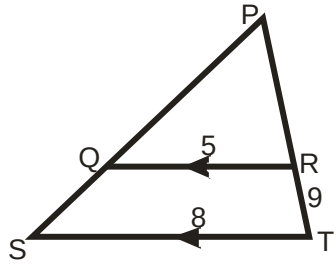
You must give a reason.



21. The tangent MN touches the circle, centre O, at L. Find the size of angle KLJ.

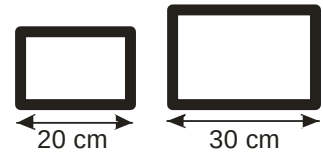


22. (a) Find PR



(b) These 2 mirrors **are similar.** The costs of the 2 mirrors are directly related to their areas.

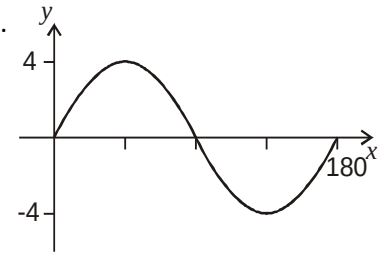
If the cost of the larger mirror is £40·68, find the cost of the smaller one?



23. Solve correct to 1 decimal place $x^2 - 7x + 8 = 0$.

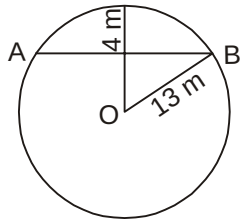
24. This graph shows the equation $y = a\sin bx$.

State the values of $\boldsymbol{a}$ and $\boldsymbol{b}$.



25. Solve the equation $4\tan x + 1 = 0$, $0 \le x \le 360$.

26. Find the length of the line AB.

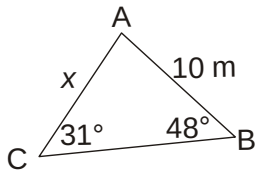


Unit 3 Applications

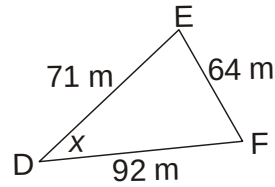
Q30, 31, 36, 37 & 38 non-calculator

27. Find *x* in the following diagrams.

a



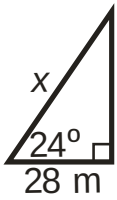
b



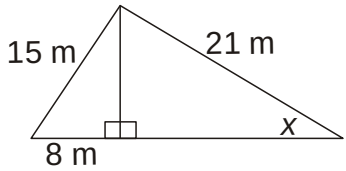
28. A ship leaves a port P and travels for 161 km on a bearing of 062° to Q.
It then turns on a bearing of 154° and sails for 90 km to R.
How far is it from R to P?

29. Calculate **x** in each diagram:

(a)

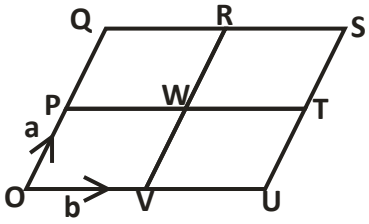


(b)

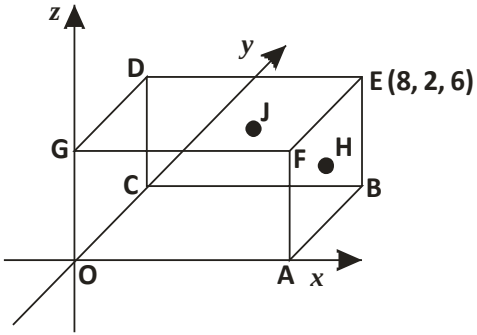


30. OQSU is made up from 4 congruent parallelograms.

Express $\overrightarrow{QT}$ and $\overrightarrow{SU}$ in terms of **a** and **b.**



31. OABCDEFG is a cuboid



H is the centre of face ABEF.

J is the centre of face BCDE.

E is the point (8, 2, 6).

(a) Write down the coordinates of all the vertices.

(b) Write down the coordinates of points H and J.

32. Given $\mathbf{a} = \begin{pmatrix} 4 \\ 1 \\ -3 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 2 \\ 8 \\ 2 \end{pmatrix}$ find the vector $2\mathbf{a} + \mathbf{b}$ and the magnitude of this resultant vector.

33. A car's value is £82 000 when bought new. If it depreciates by 9% per year, find its value after 4 years.

34. A man deposits £224 in a new bank account which pays 3·6% compound interest per annum. How much is in the account after 5 years?

35. A one year old car is worth £12936. This is a decrease of 16% of its value from new. What was the price of the new car?

36. (a) $\frac{3}{4} + \frac{1}{4} \times \frac{2}{3}$ (b) $0 \cdot 08 \times 0 \cdot 103$

37. Draw a box plot for the following data

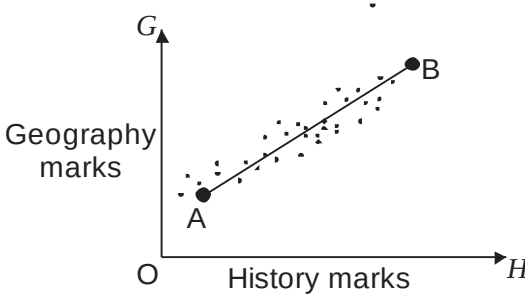
1	0 5
2	1 1 4 8
3	9
4	0 3 6 7
5	2 5

n= 13 2|1 = 21

38. Find the mean and standard deviation of 3, 6, 12, 14 and 15.

39. The prelim results were analysed in a school. The following graph shows the relationship between the Geography (G) and History (H) marks.

AB is a line of best fit.



Point A represents 27 marks for History and 28 marks for Geography.

Point B represents 36 marks for History and 34 marks for Geography.

(a) Find the equation of the straight line AB in terms of H and G.

(b) Brian scored 30 marks in History. Estimate his Geography mark.

Sheet 8

Unit 1 Expressions and Formulae

Q1-8 non-calculator

1. (a) Simplify $\sqrt{75}+\sqrt{27}$ (b) Rationalise the denominator $\frac{2}{\sqrt{6}}$

2. Evaluate $16^{\frac{3}{2}}-4^{-1}$

3. Work out $4\times10^{5}\times 149$. Write your answer in scientific notation.

4. Simplify

   (a) $(4x-3)(2x+3)$ (b) $(x-6)(2x^2+4x-3)$

5. Solve the following equations

   (a) $8x^2-4x=0$ (b) $4x^2-25=0$ (c) $x^2-14x+45=0$

6. Express $y=9+4x-x^2$ in the form $y=(x+a)^2+b$

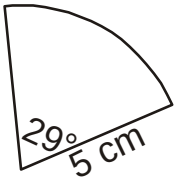
7. Simplify $\frac{x^2-16}{x^2+3x-4}$

8. Find the gradient of the line joining A(0, 7) to B(–8, 1).

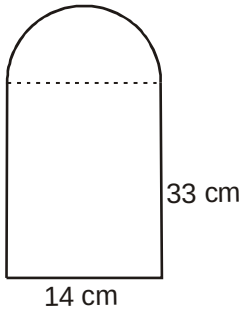
9. Find the area and perimeter of the following shapes.

Give your answer correct to 2 significant figures.

(a)

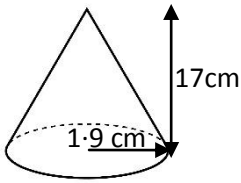


(b)

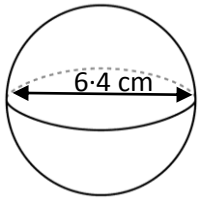


10. Calculate the volume of the following shapes

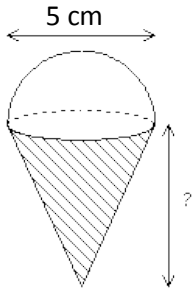
(a)



(b)



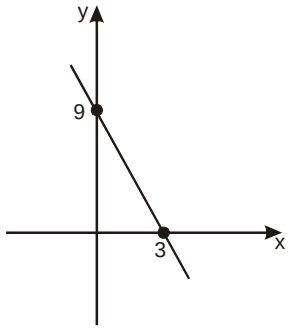
11. If the volume of the following shape is 459 cm^3 calculate the height of the cone



Unit 2 Relationships

Q12-19 non-calculator

12. Find the equation of this straight line



13. Solve the following:

(a) $4(3x-2)+12=3(x-1)$ (b) $5c+4>2(c-4)$

14. (a) A man buys 3 CDs and 7 DVDs from a shop and the cost is £98. Write down an equation for this.

(b) A woman buys 6 CDs and 2 DVDs from the same shop and the cost is £64. Write an equation for this.

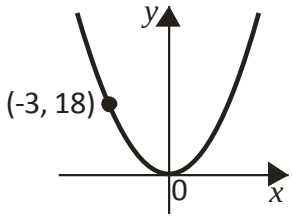
(c) Find, algebraically, the cost of a CD and a DVD.

15. Change the subject of the formula $v=2pm-2gh$ to g

16. (a) Find the roots of $y=x^2+6x+5$ and hence sketch its graph.

(b) Express $y=x^2+6x-3$ in the form $y=(x+a)^2+b$ and hence sketch its graph.

17. The parabola is in the form $y=kx^2$. What is the value of k ?

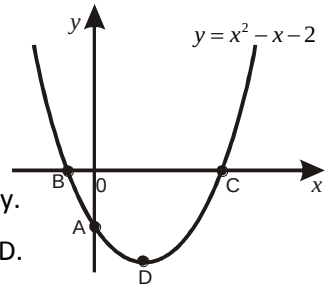


18. (a) Find the coordinates of A.

(b) Find the coordinates of B and C.

(c) State the equation of the axis of symmetry.

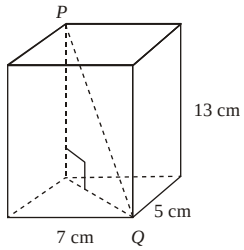
(d) Find the coordinates of the turning point D.



19. (a) Find the discriminant and the nature of the roots of $x^2 - 2x + 7 = 0$.

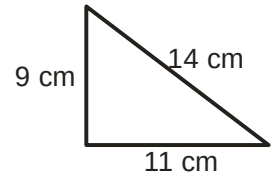
(b) Find the value(s) of p for which the equation $px^2 + 3x - 2 = 0$ has two real roots. ($p \neq 0$)

20. (a) Work out the length of PQ

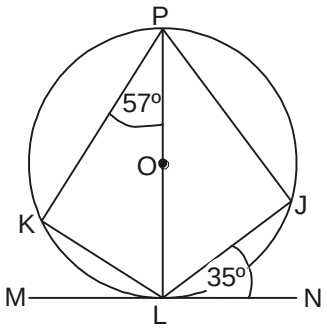


(b) Is this triangle right angled?

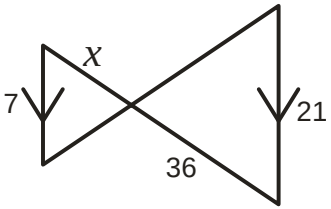
You must give a reason.



21. The tangent MN touches the circle, centre O, at L. Find the size of angle KLJ.

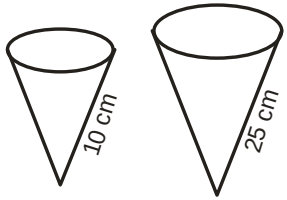


22. (a) Find x



(b) The 2 ice cream cones **are similar** in shape. The costs of the 2 cones are directly related to their volumes.

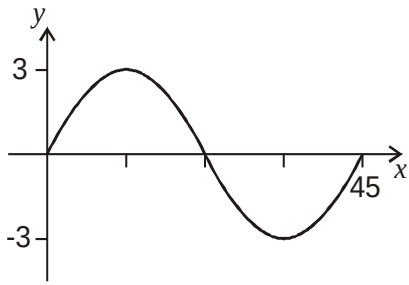
If the cost of the smaller cone is 48p, what is the cost of the larger one?



23. Solve correct to 1 decimal place $x^2 - 6x + 4 = 0$.

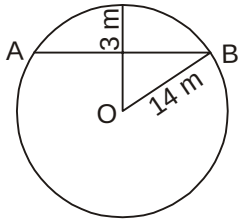
24. This graph shows the equation $y = a\sin bx$.

State the values of ***a*** and ***b***.



25. Solve the equation $10\tan x + 12 = 3$, $0 \le x \le 360$.

26. Find the length of the line AB.

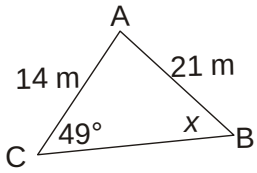


Unit 3 Applications

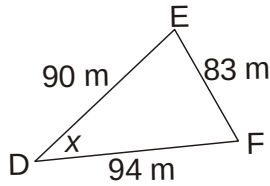
Q30, 31, 36, 37 & 38 non-calculator

27. Find *x* in the following diagrams.

a



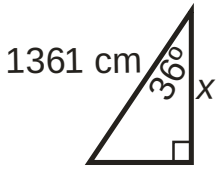
b



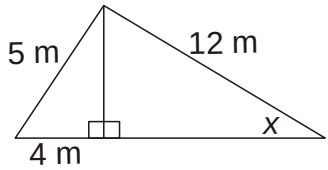
28. A ship leaves a port P and travels for 240 km on a bearing of 068° to Q.
It then turns on a bearing of 123° and sails for 154 km to R.
How far is it from R to P?

29. Calculate **x** in each diagram:

(a)

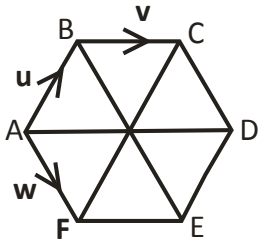


(b)

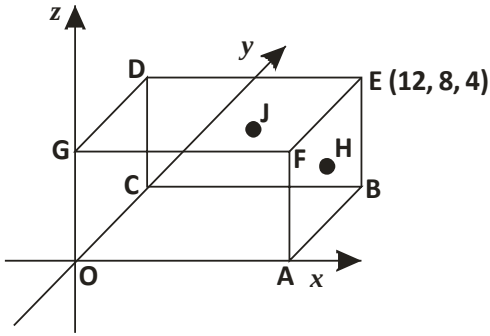


30. ABCDEF is a regular hexagon ie AB is parallel to ED etc.

Express $\overrightarrow{DF}$ and $\overrightarrow{BE}$ in terms of **u, v** and **w.**



31. OABCDEFG is a cuboid



H is the centre of face ABEF.

J is the centre of face BCDE.

E is the point (12, 8, 4).

(a) Write down the coordinates of all the vertices.

(b) Write down the coordinates of points H and J.

32. Given $\mathbf{a} = \begin{pmatrix} 0 \\ -5 \\ 2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 3 \\ -2 \\ -1 \end{pmatrix}$ find the vector $\mathbf{a} - 2\mathbf{b}$ and the magnitude of this resultant vector.

33. A car's value is £10 250 when bought new. If it depreciates by 5·3% per year, find its value after 4 years.

34. A man deposits £2948 in a new bank account which pays 2·7% compound interest per annum. How much is in the account after 3 years?

35. A carton of juice has an extra 5% free in it. If it now contains 420ml, how much did it contain before the extra?

36. (a) $\frac{3}{4} + \frac{1}{2} \times \frac{1}{5}$ (b) $0 \cdot 04 \times 0 \cdot 81$

37. Draw a box plot for the following data

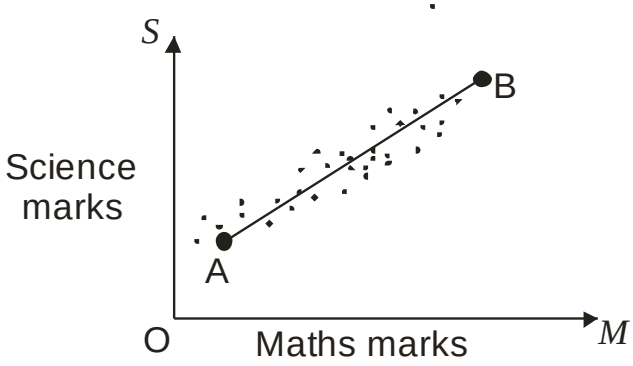
1	3 5 7
2	0 0 1 4 9
3	2 6 9
4	1 8 9 9
5	0 4 8

n= 18 1|3 = 13

38. Find the mean and standard deviation of 1, 4, 7, 10 and 13.

39. The prelim results were analysed in a school. The following graph shows the relationship between the Maths (M) and Science (S) marks.

AB is a line of best fit.



Point A represents 25 marks for Maths and 11 marks for Science.

Point B represents 35 marks for Maths and 17 marks for Science.

(a) Find the equation of the straight line AB in terms of M and S.

(b) David scored 50 marks in Maths. Estimate his Science mark.

Sheet 9

Unit 1 Expressions and Formulae

Q1-8 non-calculator

1. (a) Simplify $\sqrt{28}+\sqrt{63}$ (b) Rationalise the denominator $\frac{7}{\sqrt{7}}$

2. Evaluate $64^{\frac{3}{2}}-3^{-2}$

3. Work out $8\times10^{6}\times 143$. Write your answer in scientific notation.

4. Simplify

   (a) $(6x-1)(3x+4)$ (b) $(x-3)(2x^2+5x-9)$

5. Solve the following equations

   (a) $16x^2-8x=0$ (b) $x^2-49=0$ (c) $x^2-5x-14=0$

6. Express $y=x^2-2x+5$ in the form $y=(x+a)^2+b$

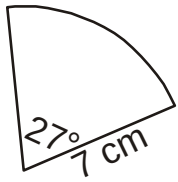
7. Simplify $\frac{x^2-9}{x^2+x-12}$

8. Find the gradient of the line joining A(3, –2) to B(13, 5).

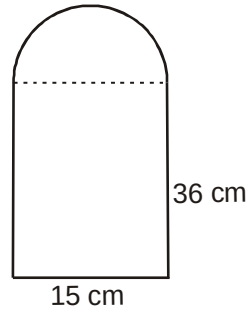
9. Find the area and perimeter of the following shapes.

Give your answer correct to 2 significant figures.

(a)

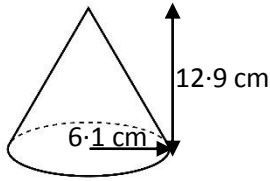


(b)

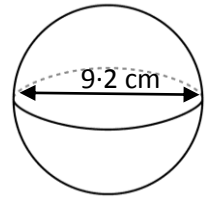


10. Calculate the volume of the following shapes

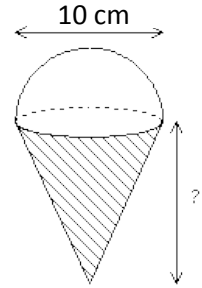
(a)



(b)



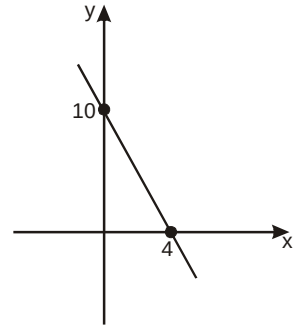
11. If the volume of the following shape is 710 cm^3 calculate the height of the cone



Unit 2 Relationships

Q12-19 non-calculator

12. Find the equation of this straight line



13. Solve the following:

(a) $2(2x-1)-(x-4)=12$ (b) $6d-2\leq 3(4d-1)$

14. (a) A man buys 5 CDs and 4 DVDs from a shop and the cost is £64. Write down an equation for this.

(b) A woman buys 6 CDs and 5 DVDs from the same shop and the cost is £79. Write an equation for this.

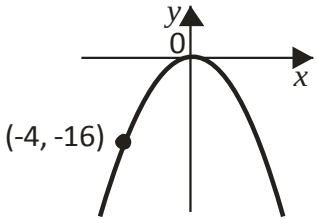
(c) Find, algebraically, the cost of a CD and a DVD.

15. Change the subject of the formula $r=\sqrt{\frac{2}{g}}$ to g

16. (a) Find the roots of $y=x^2+2x-8$ and hence sketch its graph.

(b) Express $y=12-2x-x^2$ in the form $y=(x+a)^2+b$ and hence sketch its graph.

17. The parabola is in the form $y=kx^2$. What is the value of k ?

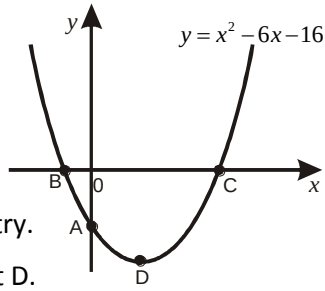


18. (a) Find the coordinates of A.

(b) Find the coordinates of B and C.

(c) State the equation of the axis of symmetry.

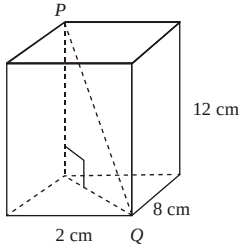
(d) Find the coordinates of the turning point D.



19. (a) Find the discriminant and the nature of the roots of $4x^2 - 12x + 9 = 0$.

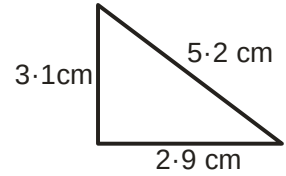
(b) Find the value(s) of p for which the equation $x^2 + 6x - p = 0$ has no real root roots. ($p \neq 0$)

20. (a) Work out the length of PQ

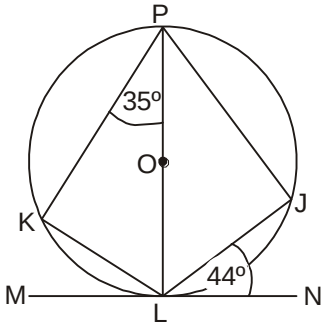


(b) Is this triangle right angled?

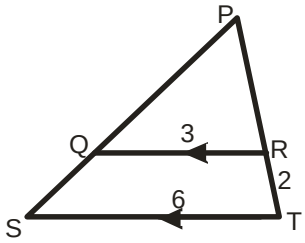
You must give a reason.



21. The tangent MN touches the circle, centre O, at L. Find the size of angle KLJ.

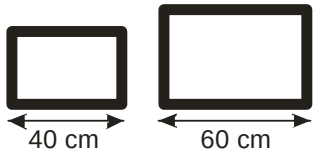


22. (a) Find PR



(b) These 2 mirrors **are similar.** The costs of the 2 mirrors are directly related to their areas.

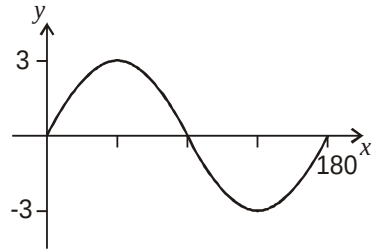
If the cost of the small mirror is £84, find the cost of the larger one?



23. Solve correct to 1 decimal place $x^2 - 7x + 11 = 0$.

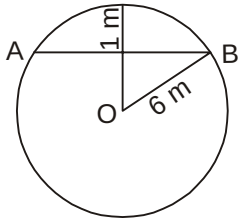
24. This graph shows the equation $y = a\sin bx$.

State the values of ***a*** and ***b***.



25. Solve the equation $7\tan x - 3 = 0$, $0 \le x \le 360$.

26. Find the length of the line AB.

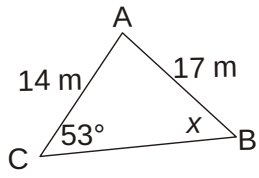


Unit 3 Applications

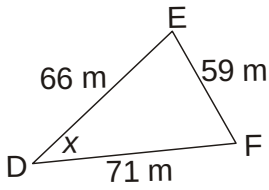
Q30, 31, 36, 37 & 38 non-calculator

27. Find *x* in the following diagrams.

a



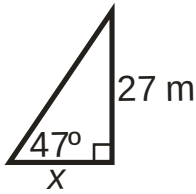
b



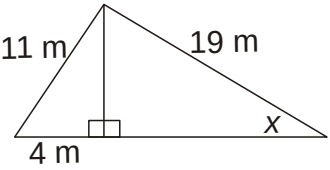
28. A ship leaves a port P and travels for 185 km on a bearing of 066° to Q.
It then turns on a bearing of 167° and sails for 190 km to R.
How far is it from R to P?

29. Calculate **x** in each diagram:

(a)

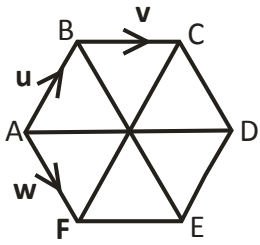


(b)

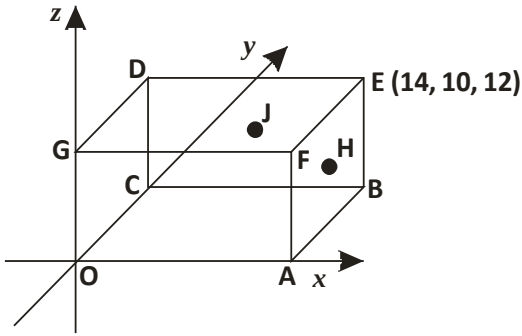


30. ABCDEF is a regular hexagon ie AB is parallel to ED etc.

Express $\overrightarrow{AC}$ and $\overrightarrow{BF}$ in terms of **u, v** and **w.**



31. OABCDEFG is a cuboid



H is the centre of face ABEF.

J is the centre of face BCDE.

E is the point (14, 10, 12).

(a) Write down the coordinates of all the vertices.

(b) Write down the coordinates of points H and J.

32. Given $\mathbf{a} = \begin{pmatrix} 2 \\ 4 \\ -2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 3 \\ 1 \\ 0 \end{pmatrix}$ find the vector $2\mathbf{a} + 3\mathbf{b}$ and the magnitude of this resultant vector.

33. A car's value is £12 300 when bought new. If it depreciates by 9% per year, find its value after 4 years.

34. A man deposits £3214 in a new bank account which pays 5·3% compound interest per annum. How much is in the account after 4 years?

35. A one year old car is worth £8712. This is a decrease of 12% of its value from new. What was the price of the new car?

36. (a) $\frac{1}{2} - \frac{2}{3} \times \frac{9}{10}$ (b) $0 \cdot 04 \times 0 \cdot 86$

37. Draw a box plot for the following data

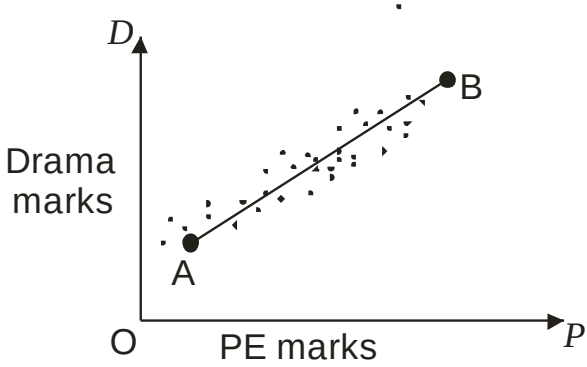
1	0 1 2
2	4 7 9
3	1 2 2 6 8
4	0 4 4 4
5	3 5 5

n= 18 1|0 = 10

38. Find the mean and standard deviation of 2, 7, 8, 11and 14.

39. The prelim results were analysed in a school. The following graph shows the relationship between the PE (P) and Drama (D) marks.

AB is a line of best fit.



Point A represents 16 marks for PE and 19 marks for Drama.

Point B represents 28 marks for PE and 28 marks for Drama.

(a) Find the equation of the straight line AB in terms of P and D.

(b) Yvonne scored 20 marks in PE. Estimate her Drama mark.

Sheet 10

Unit 1 Expressions and Formulae

Q1-8 non-calculator

1. (a) Simplify $\sqrt{32}-\sqrt{18}$ (b) Rationalise the denominator $\frac{10}{\sqrt{5}}$

2. Evaluate $32^{\frac{4}{5}}-3^{-2}$

3. Work out $6\times10^{7}\times105$. Write your answer in scientific notation.

4. Simplify

   (a) $(2x+3)(5x-6)$ (b) $(x-3)(4x^2-6x+3)$

5. Solve the following equations

   (a) $4x+12x^2=0$ (b) $25-9x^2=0$ (c) $x^2+7x-30=0$

6. Express $y=4+8x-x^2$ in the form $y=(x+a)^2+b$

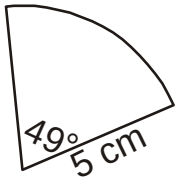
7. Simplify $\frac{x^2+x-12}{x^2-5x+6}$

8. Find the gradient of the line joining A(–1, 3) to B(5, –6).

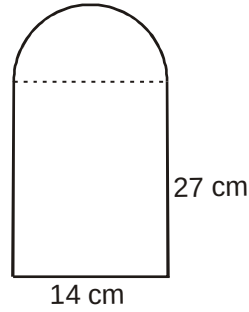
9. Find the area and perimeter of the following shapes.

Give your answer correct to 2 significant figures.

(a)

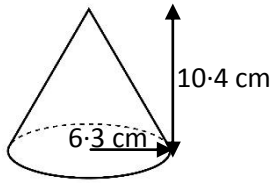


(b)

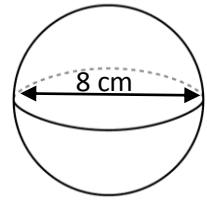


10. Calculate the volume of the following shapes

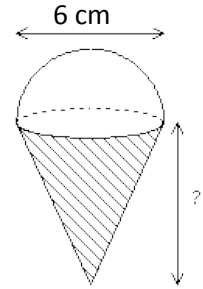
(a)



(b)



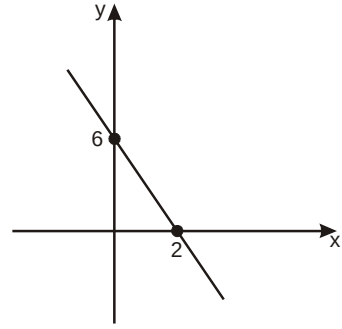
11. If the volume of the following shape is 590 cm^3 calculate the height of the cone



Unit 2 Relationships

Q12-19 non-calculator

12. Find the equation of this straight line



13. Solve the following:

(a) $5(x+4)+2(x-3)=3$ (b) $f+3>5f+23$

14. (a) A man buys 3 CDs and 6 DVDs from a shop and the cost is £63. Write down an equation for this.

(b) A woman buys 4 CDs and 4 DVDs from the same shop and the cost is £52. Write an equation for this.

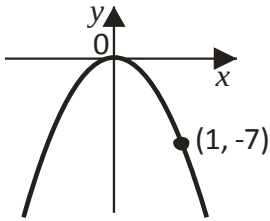
(c) Find, algebraically, the cost of a CD and a DVD.

15. Change the subject of the formula $m=2q^2-3r$ to q

16. (a) Find the roots of $y=x^2-10x+16$ and hence sketch its graph.

(b) Express $y=x^2+10x-3$ in the form $y=(x+a)^2+b$ and hence sketch its graph.

17. The parabola is in the form $y=kx^2$. What is the value of k ?

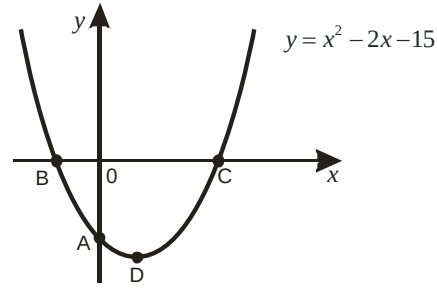


18. (a) Find the coordinates of A.

(b) Find the coordinates of B and C.

(c) State the equation of the axis of symmetry.

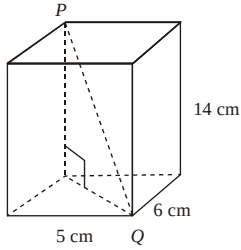
(d) Find the coordinates of the turning point D.



19. (a) Find the discriminant and the nature of the roots of $6x^2 + 5x - 4 = 0$.

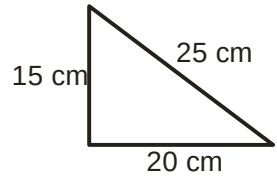
(b) Find the value(s) of p for which the equation $x^2 - 5x + p = 0$ has two real roots. ($p \neq 0$)

20. (a) Work out the length of PQ



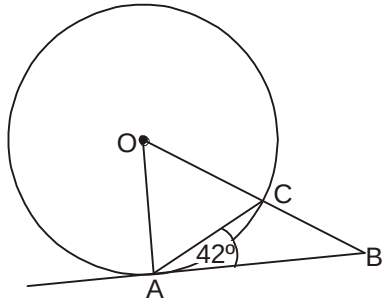
(b) Is this triangle right angled?

You must give a reason.

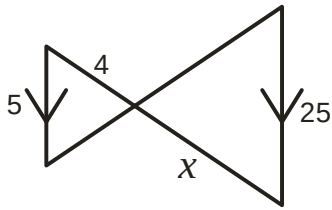


21. The tangent AB touches the circle, centre O, at A.

Find the size of angle ABC.

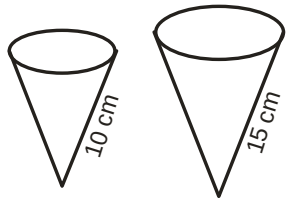


22. (a) Find x



(b) The 2 ice cream cones **are similar** in shape. The costs of the 2 cones are directly related to their volumes.

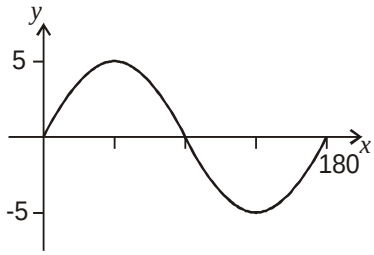
If the cost of the larger cone is 81p, what is the cost of the smaller one?



23. Solve correct to 1 decimal place $x^2 + 3x - 6 = 0$.

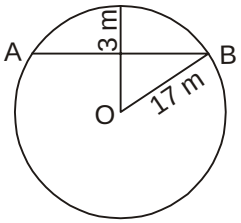
24. This graph shows the equation $y = a\sin bx$.

State the values of $\boldsymbol{a}$ and $\boldsymbol{b}$.



25. Solve the equation $3\sin x + 2 = 0$, $0 \le x \le 360$.

26. Find the length of the line AB.

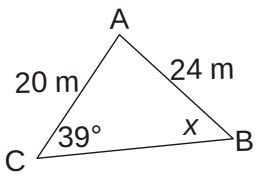


Unit 3 Applications

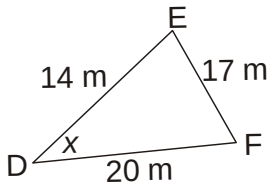
Q30, 31, 36, 37 & 38 non-calculator

27. Find *x* in the following diagrams.

a



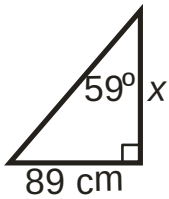
b



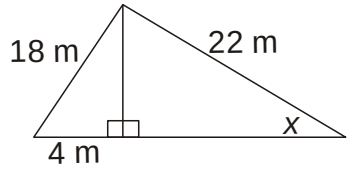
28. A ship leaves a port P and travels for 252 km on a bearing of 041° to Q.
It then turns on a bearing of 128° and sails for 330 km to R.
How far is it from R to P?

29. Calculate **x** in each diagram:

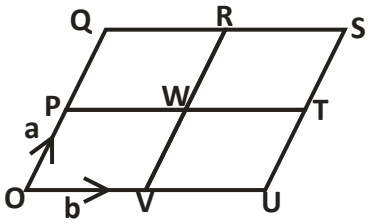
(a)



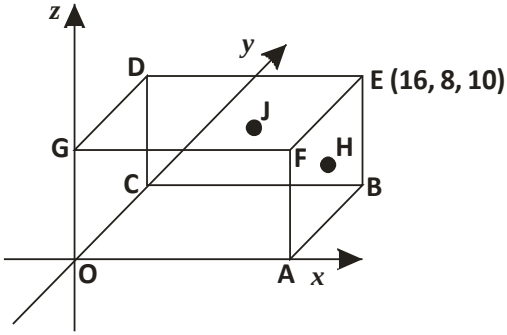
(b)



30. OQSU is made up from 4 congruent parallelograms.
Express $\overrightarrow{QU}$ and $\overrightarrow{VQ}$ in terms of **a** and **b.**



31. OABCDEFG is a cuboid



H is the centre of face ABEF.

J is the centre of face BCDE.

E is the point (16, 8, 10).

(a) Write down the coordinates of all the vertices.

(b) Write down the coordinates of points H and J.

32. Given $\mathbf{a} = \begin{pmatrix} -4 \\ 0 \\ 2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 2 \\ -2 \\ -3 \end{pmatrix}$ find the vector $2\mathbf{a} - \mathbf{b}$ and the magnitude of this resultant vector.

33. A car's value is £13 200 when bought new. If it depreciates by 8% per year, find its value after 3 years.

34. A man deposits £20182 in a new bank account which pays 4·9% compound interest per annum. How much is in the account after 5 years?

35. A carton of juice has an extra 10% free in it. If it now contains 572ml, how much did it contain before the extra

36. (a) $\frac{1}{3} \times \frac{2}{5} + \frac{3}{4}$ (b) $0 \cdot 12 \times 0 \cdot 61$

37. Draw a box plot for the following data

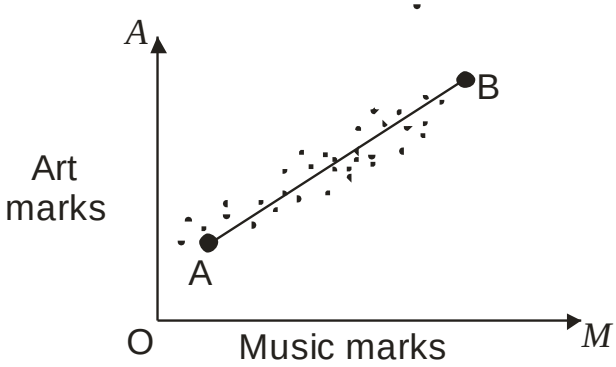
1	1 5
2	4 6 7 8
3	2 3 3 7
4	1 5 9
5	2 4 9 9

n= 17 1|1 = 11

38. Find the mean and standard deviation of 1, 2, 2, 4, 4 and 5.

39. The prelim results were analysed in a school. The following graph shows the relationship between the Music (M) and Art (A) marks.

AB is a line of best fit.



Point A represents 28 marks for Music and 48 marks for Art.

Point B represents 42 marks for Music and 56 marks for Art.

(a) Find the equation of the straight line AB in terms of M and A.

(b) Emily scored 35 marks in Music. Estimate her Art mark.

Sheet 11

Unit 1 Expressions and Formulae

Q1-8 non-calculator

1. (a) Simplify $2\sqrt{8}+\sqrt{50}$ (b) Rationalise the denominator $\frac{4}{\sqrt{13}}$

2. Evaluate $8^{\frac{2}{3}}+5^{-1}$

3. Work out $6\times10^{-4} \div 400$. Write your answer in scientific notation.

4. Simplify

   (a) $(2x+7)(4x-5)$ (b) $(x-4)(5x^2-4x-3)$

5. Solve the following equations

   (a) $5x^2-25x=0$ (b) $49x^2-16=0$ (c) $x^2+7x-18=0$

6. Express $y=x^2+8x-2$ in the form $y=(x+a)^2+b$

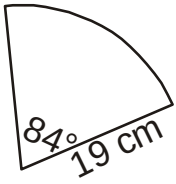
7. Simplify $\frac{x^2-9}{3x^2-14x+15}$

8. Find the gradient of the line joining A(4, –1) to B(8, 9).

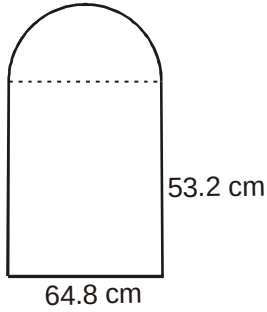
9. Find the area and perimeter of the following shapes.

Give your answer correct to 2 significant figures.

(a)

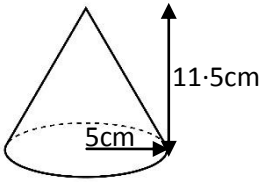


(b)

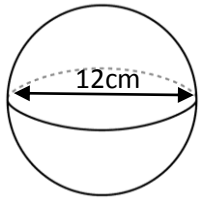


10. Calculate the volume of the following shapes

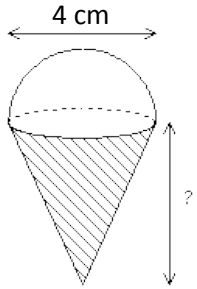
(a)



(b)



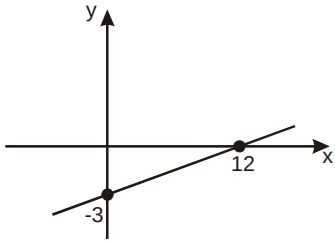
11. If the volume of the following shape is 350 cm^3 calculate the height of the cone



Unit 2 Relationships

Q12-19 non-calculator

12. Find the equation of this straight line



13. Solve the following:

(a) $3(x-2)-3(2x-1)=7$ (b) $2x-5\geq 3x+1$

14. (a) A mother is 5 times the age of her daughter.
Write down an equation for this.

(b) Their ages add up to 36. Write an equation for this.

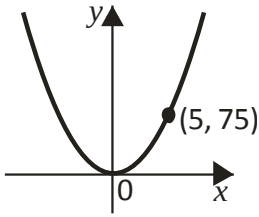
(c) Find, algebraically, the ages of the mother and the daughter.

15. Change the subject of the formula $u=\dfrac{v}{p-q}$ to p

16. (a) Find the roots of $y=x^2-4x$ and hence sketch its graph.

(b) Express $y=4-8x-x^2$ in the form $y=(x+a)^2+b$ and hence sketch its graph.

17. The parabola is in the form $y=kx^2$. What is the value of k ?

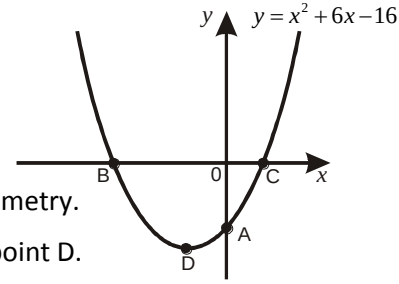


18. (a) Find the coordinates of A.

(b) Find the coordinates of B and C.

(c) State the equation of the axis of symmetry.

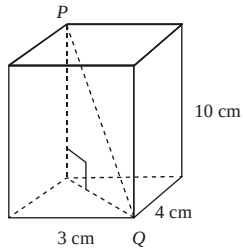
(d) Find the coordinates of the turning point D.



19. (a) Find the discriminant and the nature of the roots of $2x^2 + 9x - 2 = 0$.

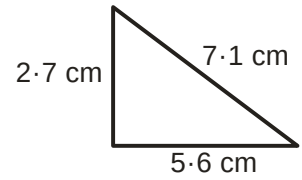
(b) Find the value(s) of p for which the equation $x^2 + 2px + 4 = 0$ has only one real root. ($p \neq 0$)

20. (a) Work out the length of PQ

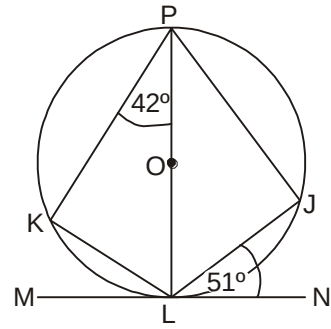


(b) Is this triangle right angled?

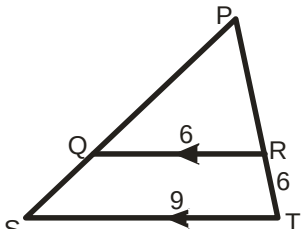
You must give a reason.



21. The tangent MN touches the circle, centre O, at L. Find the size of angle KLJ.

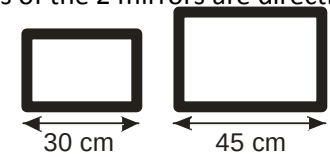


22. (a) Find PR x



(b) These 2 mirrors **are similar.** The costs of the 2 mirrors are directly relate

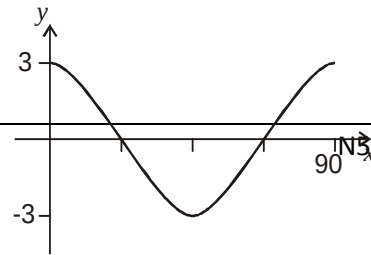
If the cost of the larger mirror is £81, find the cost of the smaller one?



23. Solve correct to 1 decimal place $x^2 - 6x - 3 = 0$.

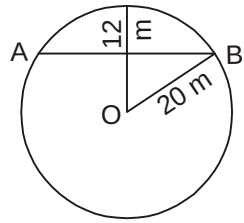
24. This graph shows the equation $y = a\cos bx$.

State the values of ***a*** and ***b***.



25. Solve the equation $2\sin x - \sqrt{3} = 0$, $0 \le x \le 360$.

26. Find the length of the line AB.

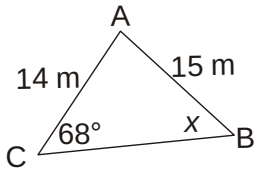


Unit 3 Applications

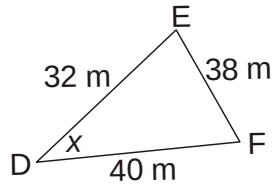
Q30, 31, 36, 37 &38 non-calculator

27. Find *x* in the following diagrams.

a



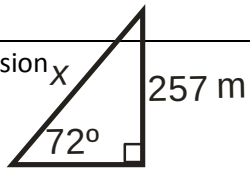
b



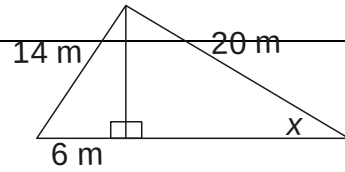
28. A ship leaves a port P and travels for 58 km on a bearing of 028° to Q.
It then turns on a bearing of 154° and sails for 62 km to R.
How far is it from R to P?

29. Calculate **x** in each diagram:

(a)

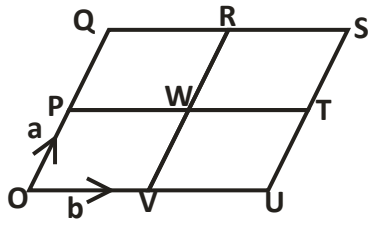


(b)

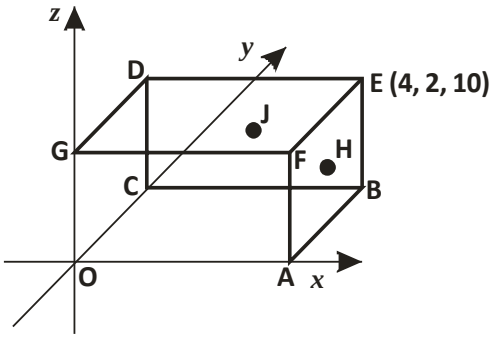


30. OQSU is made up from 4 congruent parallelograms.

Express $\overrightarrow{US}$ and $\overrightarrow{WQ}$ in terms of **a** and **b.**



31. OABCDEFG is a cuboid



H is the centre of face ABEF.

J is the centre of face BCDE.

E is the point (4, 2, 10).

(a) Write down the coordinates of all the vertices.

(b) Write down the coordinates of points H and J.

32. Given $\mathbf{a} = \begin{pmatrix} 5 \\ 1 \\ 3 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 4 \\ -2 \\ -1 \end{pmatrix}$ find the vector $\mathbf{a} + 3\mathbf{b}$ and the magnitude of this resultant vector.

33. A town's population is 340 000. If it increases by 5% per year, find its population after 2 years.

34. A man deposits £19512 in a new bank account which pays 1·8% compound interest per annum. How much is in the account after 6 years?

35. A one year old car is worth £12462. This is a decrease of 7% of its value from new. What was the price of the new car?

36. (a) $\frac{3}{7} - \frac{1}{4} \times \frac{2}{3}$ (b) $0 \cdot 05 \times 0 \cdot 71$

37. Draw a box plot for the following data

1 0 0 1

2 4 9 9

3 1 2 4 7 8

4 0 2 5

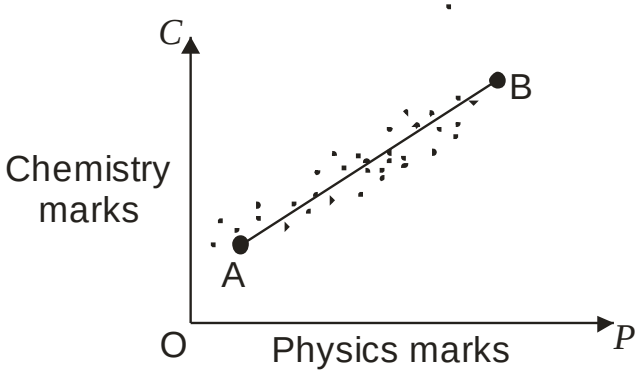
5 1 4

n= 16 1 | 0 = 10

38. Find the mean and standard deviation of 3, 5, 8, 15, 29 and 30.

39. The prelim results were analysed in a school. The following graph shows the relationship between the Physics (P) and Chemistry (C) marks.

AB is a line of best fit.



Point A represents 35 marks for Physics and 19 marks for Chemistry.

Point B represents 50 marks for Physics and 25 marks for Chemistry.

(a) Find the equation of the straight line AB in terms of P and C.

(b) Stuart scored 60 marks in Physics. Estimate his Chemistry mark.

Sheet 12

Unit 1 Expressions and Formulae

Q1-8 non-calculator

1. (a) Simplify $\sqrt{28}+2\sqrt{63}$ (b) Rationalise the denominator $\frac{12}{\sqrt{3}}$

2. Evaluate $25^{\frac{3}{2}}-5^{-1}$

3. Work out $4\times10^{9}\times101$. Write your answer in scientific notation.

4. Simplify

   (a) $(3x-5)(4x-1)$ (b) $(x+3)(4x^2+x-9)$

5. Solve the following equations

   (a) $10x^2-5x=0$ (b) $16x^2-36=0$ (c) $x^2+x-42=0$

6. Express $y=2-2x-x^2$ in the form $y=(x+a)^2+b$

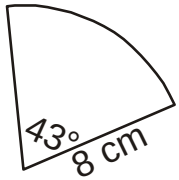
7. Simplify $\frac{x^2-9}{x^2+8x+15}$

8. Find the gradient of the line joining A(–2, –5) to B0, 2).

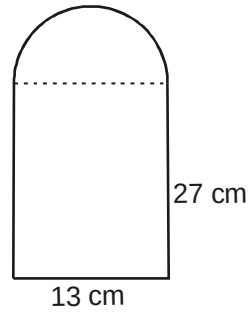
9. Find the area and perimeter of the following shapes.

Give your answer correct to 2 significant figures.

(a)

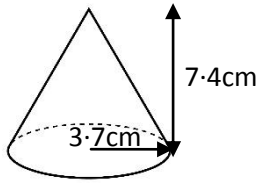


(b)

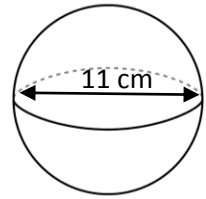


10. Calculate the volume of the following shapes

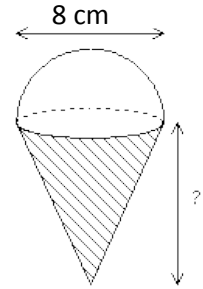
(a)



(b)



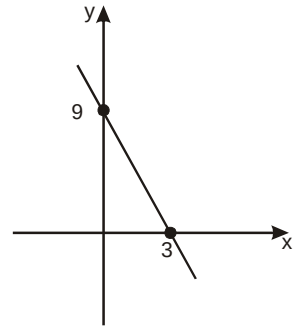
11. If the volume of the following shape is 478 cm^3 calculate the height of the cone



Unit 2 Relationships

Q12-19 non-calculator

12. Find the equation of this straight line



13. Solve the following:

(a) $3-(2x-1)=4x-3$ (b) $3y+7<5y-11$

14. (a) A man buys 5 CDs and 9 DVDs from a shop and the cost is £143. Write down an equation for this.

(b) A woman buys 2 CDs and 5 DVDs from the same shop and the cost is £74. Write an equation for this.

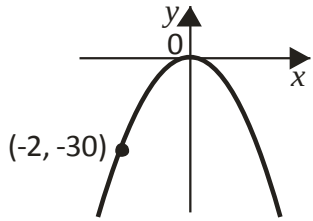
(c) Find, algebraically, the cost of a CD and a DVD.

15. Change the subject of the formula $v=\frac{lmp}{2r}$ to m

16. (a) Find the roots of $y=x^2-9$ and hence sketch its graph.

(b) Express $y=x^2+6x+11$ in the form $y=(x+a)^2+b$ and hence sketch its graph.

17. The parabola is in the form $y=kx^2$. What is the value of k ?

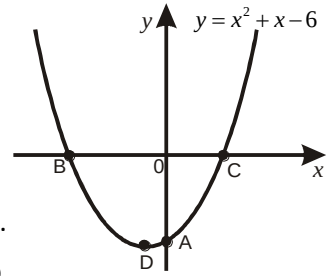


18. (a) Find the coordinates of A.

(b) Find the coordinates of B and C.

(c) State the equation of the axis of symmetry.

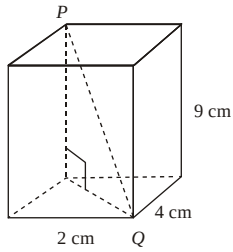
(d) Find the coordinates of the turning point D.



19. (a) Find the discriminant and the nature of the roots of $3x^2 - 7x + 1 = 0$.

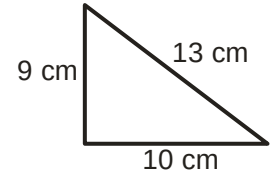
(b) Find the value(s) of p for which the equation $px^2 - 3p + 5 = 0$ has no real roots. ($p \neq 0$)

20. (a) Work out the length of PQ



(b) Is this triangle right angled?

You must give a reason.



21. The tangent MN touches the circle, centre O, at L.

Find the size of angle KLJ.

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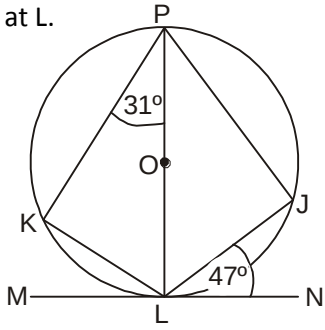
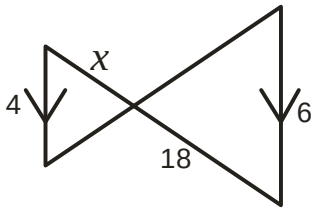
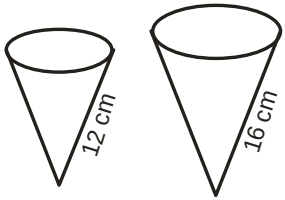


22. (a) Find x



(b) The 2 ice cream cones **are similar** in shape. The costs of the 2 cones are directly related to their volumes.

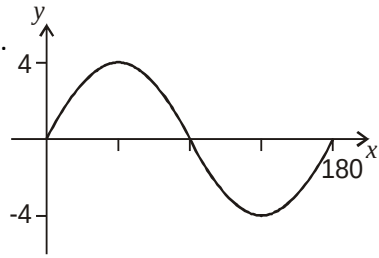
If the cost of the smaller cone is 54p, what is the cost of the larger one?



23. Solve correct to 1 decimal place $x^2 + 4x - 7 = 0$.

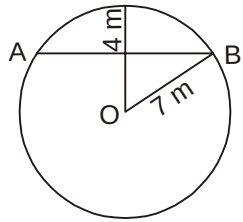
24. This graph shows the equation $y = a\sin bx$.

State the values of $\boldsymbol{a}$ and $\boldsymbol{b}$.



25. Solve the equation $6\cos x + 1 = 0$, $0 \le x \le 360$.

26. Find the length of the line AB.

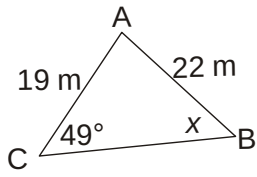


Unit 3 Applications

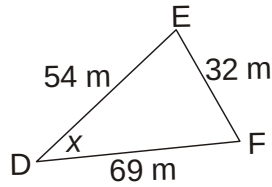
Q30, 31, 36, 37 &38 non-calculator

27. Find *x* in the following diagrams.

a



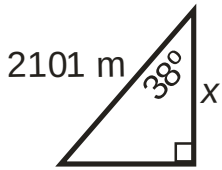
b



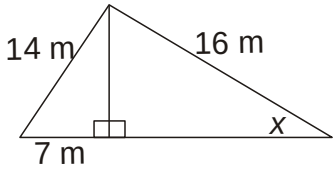
28. A ship leaves a port P and travels for 68 km on a bearing of 063° to Q.
It then turns on a bearing of 132° and sails for 59 km to R.
How far is it from R to P?

29. Calculate **x** in each diagram:

(a)

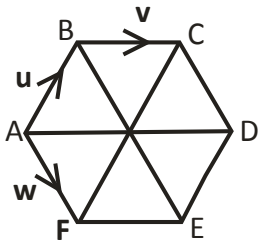


(b)

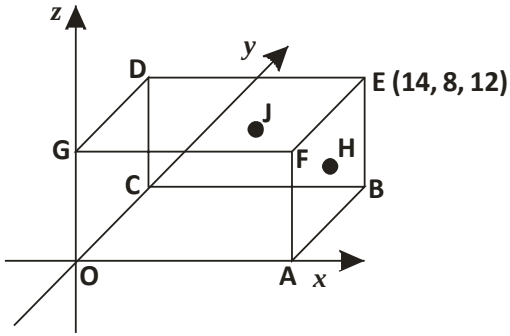


30. ABCDEF is a regular hexagon ie AB is parallel to ED etc.

Express $\overrightarrow{CF}$ and $\overrightarrow{AC}$ in terms of **u, v** and **w.**



31. OABCDEFG is a cuboid



H is the centre of face ABEF.

J is the centre of face BCDE.

E is the point (14, 8, 2).

(a) Write down the coordinates of all the vertices.

(b) Write down the coordinates of points H and J.

32. Given $\mathbf{a} = \begin{pmatrix} 9 \\ 2 \\ -3 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 11 \\ 4 \\ 5 \end{pmatrix}$ find the vector $3\mathbf{a} - 2\mathbf{b}$ and the magnitude of this resultant vector.

33. A car's value is £18 800 when bought new. If it depreciates by 7% per year, find its value after 3 years.

34. A man deposits £768 in a new bank account which pays 3·4% compound interest per annum. How much is in the account after 6 years?

35. A carton of juice has an extra 14% free in it. If it now contains 342ml, how much did it contain before the extra

36. (a) $\frac{4}{9} - \frac{1}{6} \times \frac{2}{3}$ (b) $0 \cdot 004 \times 0 \cdot 81$

37. Draw a box plot for the following data

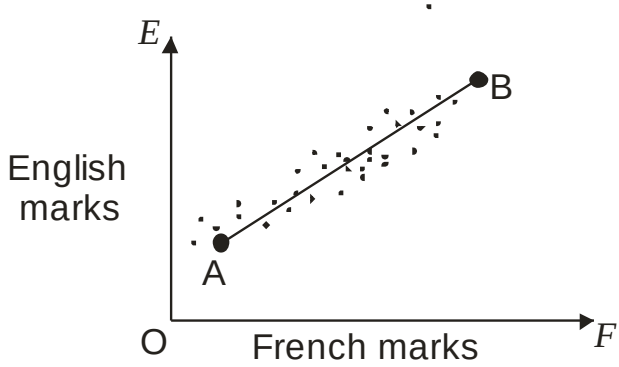
1	2
2	1 1 3 4
3	3 7 8
4	0 2 4 4 9
5	3 9 9

n= 16 1|2 = 12

38. Find the mean and standard deviation of 3, 8, 17, 20 and 32

39. The prelim results were analysed in a school. The following graph shows the relationship between the French (F) and English (E) marks.

AB is a line of best fit.



Point A represents 35 marks for French and 25 marks for English.

Point B represents 49 marks for French and 37 marks for English.

(a) Find the equation of the straight line AB in terms of F and E.

(b) Karen scored 63 marks in French. Estimate her English mark.