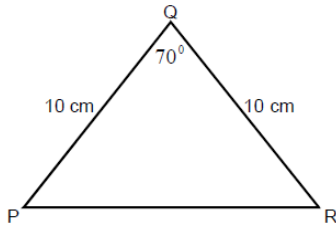


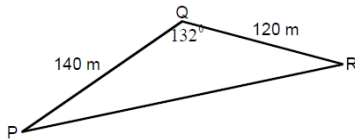
National 5 Revision Questions

Q1. Calculate the area of PQR



**Q2. A line passes through (-2, 3) and (3, -5).
State the equation of the line.**

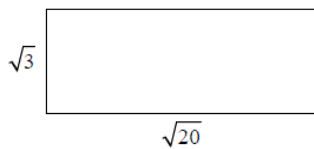
Q3. Calculate the length of PR



Q4.

Find the equation of the line through the point (-1, 4) which is parallel to the line with equation $3x - y + 2 = 0$.

**Q5. Calculate the area of the rectangle,
give your answer as a surd in its simplest
form.**



Q6.

A function f is given by $f(x) = 2x^2 - x - 9$.

Which of the following describes the nature of the roots of $f(x) = 0$?

- A No real roots
- B Equal roots
- C Real distinct roots
- D Rational distinct roots

National 5 Revision Questions

Q7.

In the diagram below the volume of the cylinder is **double** that of the cube.



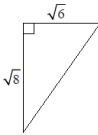
Calculate the height of the cylinder.

Q8.

Find the range of values of k such that the equation $kx^2 - x - 1 = 0$ has no real roots.

Q9.

Calculate the area of the triangle, give your answer as a surd in its simplest form.



Q10.

Here are two statements about the roots of the equation $x^2 + x + 1 = 0$:

- (1) the roots are equal;
- (2) the roots are real.

Which of the following is true?

- A Neither statement is correct.
- B Only statement (1) is correct.
- C Only statement (2) is correct.
- D Both statements are correct.

Q11.

The stem and leaf diagram shows the cost of cars in a show room.



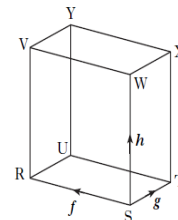
- (a) Find the range of the costs
- (b) Find the median cost.

Q12.

In the diagram RSTU, VWXY represents a cuboid.

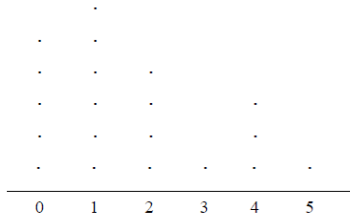
\vec{SR} represents vector f , \vec{ST} represents vector g and \vec{SW} represents vector h .

Express \vec{VT} in terms of f, g and h .



National 5 Revision Questions

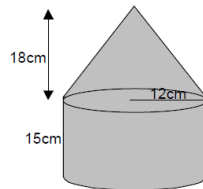
Q13. The number goals scored by 20 football teams on Saturday were



- (a) What is the modal number of goals scored?
 (b) Find the median.

Q14. The equation $3x^2 + x + m = 0$ has equal roots. What is the value of m ?

Q15. Calculate the total volume



Q16. $7 - 8x - x^2$ is expressed in the form $a - (x + b)^2$. What is the value of a ?

Q17. Simplify

$$\frac{5n^{-2} \times 4n^5}{10n^{-3}}$$

Q18. Here are two statements about the roots of equation $x^2 - x - 2 = 0$

- (1) The roots are rational
 (2) The roots are real

Which of the following is true?

- A Neither statement is correct.
 B Only statement 1 is correct.
 C Only statement 2 is correct.
 D Both statements are correct.

National 5 Revision Questions

Q19.

The cost of a holiday increased by 8% from the years 2001 to 2002. If it cost £540 for the holiday in 2002, what was the cost in 2001?

Q21. Find the value of

$$25^{\frac{3}{2}}$$

Q23.

The marks of 7 pupils in an advanced higher maths exam were

77 67 43 90 66 93 75

Calculate the mean and standard deviation of these marks.

Another group of 7 pupils who sat the same exam had a mean of 78 and a standard deviation of 3.2.
Make two comparisons of the marks of the two groups.

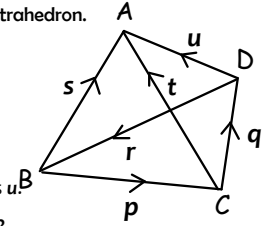
In the diagram, ABCD represents a tetrahedron.

Q20.

\overrightarrow{BC} represents p , \overrightarrow{CD} represents q ,

\overrightarrow{DB} represents r , \overrightarrow{BA} represents s ,

\overrightarrow{CA} represents t and \overrightarrow{DA} represents u .



One of the statements is false, which one?

- A $p = -q + s - u$
- B $q = -p + s + u$
- C $r = -p - t + u$
- D $s = p + q + u$

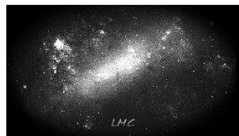
Q22. A line through the points $A(2k, 3)$ and $B(k, 5)$ has a gradient of 4. What is the value of k ?

Q24. $(x + 4)(x - 2)$ can be written in the form $(x + a)^2 + b$. What is the value of b ?

National 5 Revision Questions

Q25.

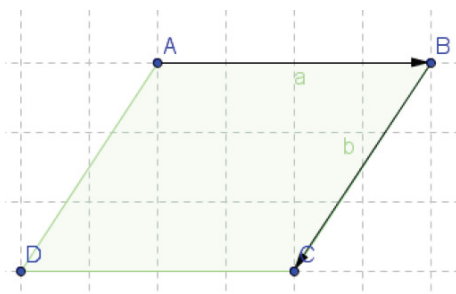
The large Magellanic cloud is 1.69×10^{18} kilometres from Earth. Write this distance as an ordinary number.



Q26. Solve

$$\frac{x(x+5)}{4} = 9$$

Q27. Write the vector AC in terms of A and B

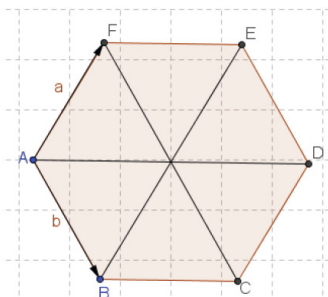


Q28.

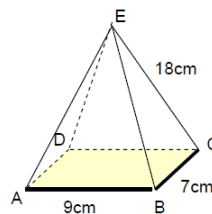
$$(t^4)^3$$

Write the vector AE in terms of a and b

Q29.



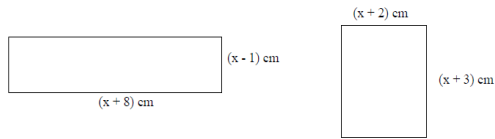
Q30. Find the diagonal AC



National 5 Revision Questions

Q31.

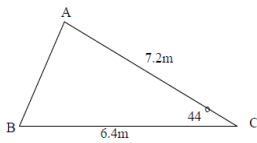
The following rectangles have the same area. Find the value of x .



4

Q33.

The following diagrams show a triangle ABC.



- (a) Calculate the length of AB (to 2 significant figures).
Do not use a scale drawing.
- (b) Calculate the area of triangle ABC.

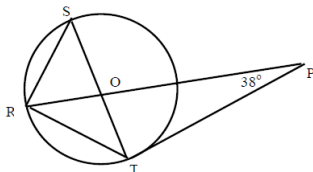
Mar

4

2

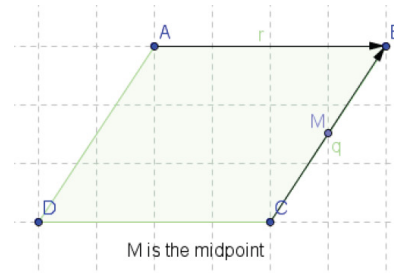
Q35.

In the diagram below PT is a tangent to the circle. O is the center of the circle and angle RPT is 38° . Find the size of angle ORS.



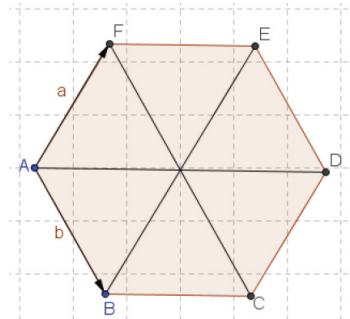
Q32.

Write the vector AM in terms of r and q



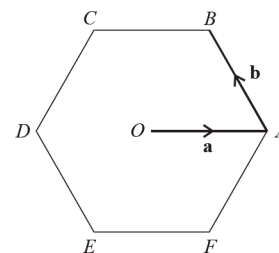
Write the vector AD in terms of a and b

Q34.



Write the vector AC in terms of a and b

Q36.

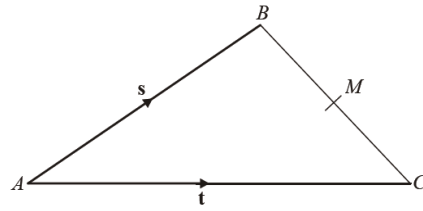


National 5 Revision Questions

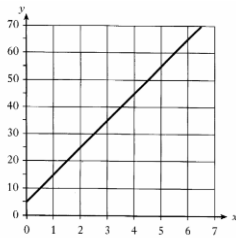
Q37.

Evaluate $3\frac{2}{5} - 1\frac{3}{4}$

Write the vector BC in terms of s and t
Q38.

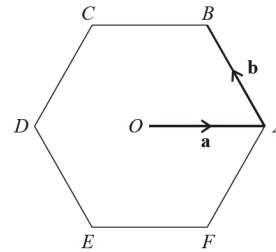


Q3



Find the equation of this straight line in the form $y = mx + c$

Write the vector EC in terms of s and t
Q40.

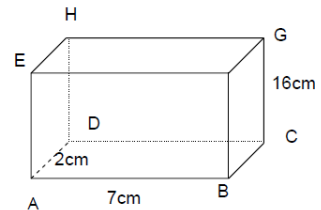


Q41.

Express $y = x^2 + 8x - 7$ in the form $y = (x + a)^2 + b$ and hence state the coordinates of the turning point.

Q42.

Find the diagonal AC



National 5 Revision Questions

Q43.

$$t^{11} \div t^5$$

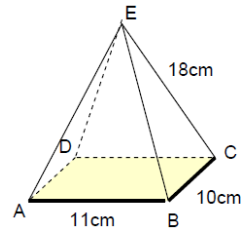
Q45.

$$\frac{y^7}{y^2}$$

Q47. Simplify

$$(3x^2y)^2$$

Q44. Find the height



Q46. Rationalise
the denominator

$$\frac{12}{\sqrt{6}}$$

Q48. Multiply out and simplify

$$(1 + \sqrt{2})^2$$

National 5 Revision Questions

Q49.

$$\frac{6y^5 \times 2y^6}{4y^8}$$

Q50.

$$\frac{8y^9}{2y \times 2y^3}$$

Q51.

Solve

$$4x - 5 > 2x - 15$$

Q52.

$$\sqrt{20} + \sqrt{45}$$

Q53.

$$P = R^3b - 5$$

Change the subject of the formula to R .

Q54.

$$\sqrt{75} - \sqrt{48}$$

National 5 Revision Questions

Q55.

Two vectors are defined as $\mathbf{u} = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$ and $\mathbf{v} = \begin{pmatrix} -4 \\ 3 \end{pmatrix}$.

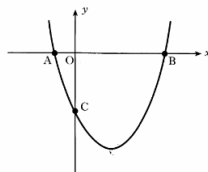
- Find the resultant vector $\mathbf{u} + 3\mathbf{v}$.
- Find $|\mathbf{u} + 3\mathbf{v}|$.

Q57.

Find the point of intersection of the straight lines with equations

$$2x + y = 5 \quad \text{and} \quad x - 3y = 6.$$

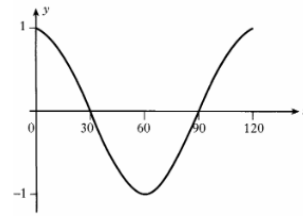
Q59.



The equation of the parabola in the diagram above is $y = (x - 2)^2 - 9$.

- State the coordinates of the minimum turning point of the parabola.
- Find the coordinates of C.
- A is the point $(-1, 0)$. State the coordinates of B.

Q56.



Part of the graph of $y = \cos bx^\circ$ is shown in the diagram.

State the value of b .

Q58.

A parabola has equation $y = x^2 - 3x + 7$.

Using the discriminant, determine the nature of its roots.

Q60.

Express $\frac{3}{x} - \frac{5}{x+2}$, $x \neq 0, x \neq -2$, as a single fraction in its simplest form.

National 5 Revision Questions

Q61.

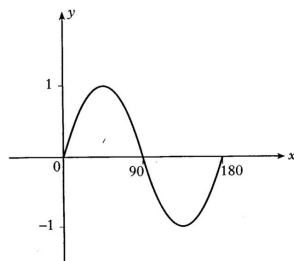
The total emissions of greenhouse gases by the USA in 2007 amounted to the equivalent of 7.2 million tonnes of carbon dioxide. If the annual increase in emissions is 1.2%, calculate the total amount of emissions of greenhouse gases by the USA expected in 2010. Give your answer in millions of tonnes to 2 s.f.

Q63.

Change the subject of the formula to r .

$$A = 4\pi r^2.$$

Q65.



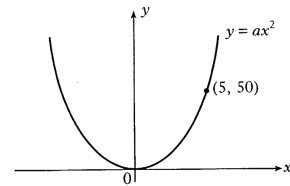
The graph of $y = \sin bx^\circ$ is shown in the diagram.
State the value of b .

Q62. Multiply out and simplify

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

Q64.

The diagram below shows the graph of $y = ax^2$.



Find the value of a .

150 patients have been given a flu vaccine.

The data is shown in the table below.

Q66.

| AGE | GENDER | |
|------------|--------|--------|
| | male | female |
| 5 or under | 4 | 3 |
| 6 - 15 | 7 | 8 |
| 16 - 59 | 37 | 47 |
| 60 or over | 12 | 32 |

What is the probability that

- (a) a patient given the flu vaccine was male **and** aged 60 or over?
 (b) a patient given the flu vaccine was aged 5 or under?

National 5 Revision Questions

Q67.

Joan buys gold and silver charms to make bracelets.
2 gold charms and 5 silver charms cost £125.

(a) Let g pounds be the cost of one gold charm and s pounds be the cost of one silver charm.

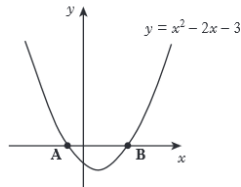
Write down an equation in terms of g and s to illustrate the above information.

4 gold charms and 3 silver charms cost £145.

(b) Write down another equation in terms of g and s to illustrate this information.

(c) Hence calculate the cost of each type of charm.

Q69. The parabola with equation $y = x^2 - 2x - 3$ cuts the x -axis at the points A and B as shown in the diagram.



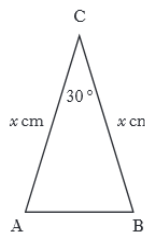
(a) Find the coordinates of A and B.

(b) Write down the equation of the axis of symmetry of $y = x^2 - 2x - 3$.

Q71.

ABC is an isosceles triangle with angle $ACB = 30^\circ$.

$AC = BC = x$ centimetres.



The area of triangle ABC is 9 square centimetres.

Calculate the value of x .

Q68.

Solve the inequality

$$4x - 5 \leq 7x - 20.$$

Q70.

Solve the equation

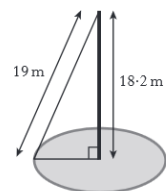
$$2x^2 + 7x - 3 = 0.$$

Give your answers **correct to 1 decimal place**.

Q72.

A mobile phone mast, 18.2 metres high, stands vertically in the centre of a circle.

It is supported by a wire rope, 19 metres long, attached to the ground at a point on the circumference of the circle, as shown.

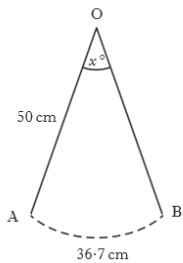


Calculate the circumference of the circle.

National 5 Revision Questions

Q73.

As the pendulum of a clock swings, its tip moves through an arc of a circle.



The length of the pendulum is 50 centimetres.
The length of the arc is 36.7 centimetres.
Calculate x° , the angle through which the pendulum swings.

Q75.

(a) Express $\frac{a^{\frac{1}{2}} \times a^{\frac{5}{2}}}{a^2}$ in its simplest form.

(b) Express $\frac{2}{\sqrt{3}}$ as a fraction with a rational denominator.

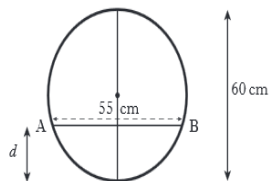
(c) Express $\frac{2}{x} + \frac{4}{x+3}$, $x \neq 0$, $x \neq -3$, as a single fraction in its simplest form.

Q77.

Change the subject of the formula $r = \frac{st}{q}$ to s .

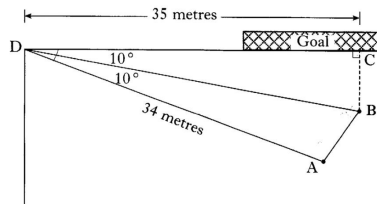
Q74.

Water flows through a horizontal pipe of diameter 60 centimetres.
The surface width, AB, of the water is 55 centimetres.



- Calculate the depth, d , of the water in the pipe.
- What other depth of water would give the same surface width?

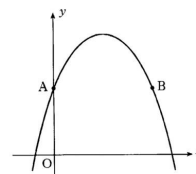
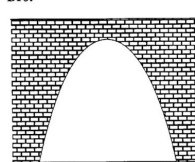
Q76.



The diagram shows part of a football pitch with players at A, B, C and D.
BC is perpendicular to CD.
CD = 35 metres, angle CDB = 10° , angle BDA = 10° , AD = 34 metres.
Find the distance from A to B.

5

Q78.



The arch of a railway bridge is represented by a parabola. The equation of the parabola is

$$y = 20 - (x - 3)^2.$$

- State the coordinates of the maximum turning point of the parabola. 2
- State the equation of the axis of symmetry. 1
- Points A and B have the same y -coordinate. A is the point (0, 11). State the coordinates of B. 2

National 5 Revision Questions

Q79.

Solve the equation

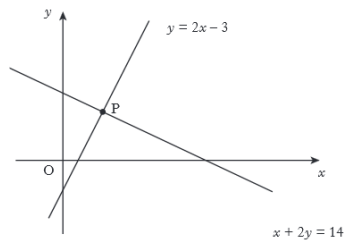
$$4\sin x^\circ - 1 = 0, \quad 0 \leq x < 360.$$

3

Q81.

The graph below shows two straight lines.

- s $y = 2x - 3$
- s $x + 2y = 14$



The lines intersect at the point P.

Find, **algebraically**, the coordinates of P.

Q83.

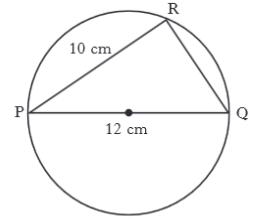
(a) Evaluate $(2^3)^2$.

(b) Hence find n , when $(2^3)^n = \frac{1}{64}$.

Q80.

In the diagram,

- s PQ is the diameter of the circle
- s PQ = 12 centimetres
- s PR = 10 centimetres.

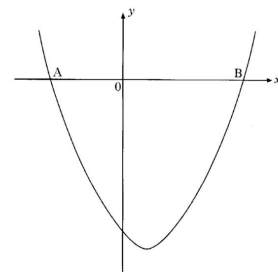


Calculate the length of QR.

Give your answer as a surd in its simplest form.

Q82.

6.



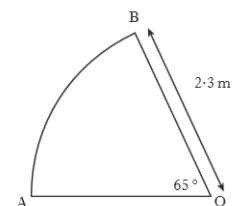
The equation of the parabola in the above diagram is

$$y = (x - 1)^2 - 16.$$

- (a) State the coordinates of the minimum turning point of the parabola. 2
- (b) State the equation of the axis of symmetry of the parabola. 1
- (c) The parabola cuts the x-axis at A and B. Find the length of AB. 3

Q84.

A sector of a circle, centre O, is shown below.



The radius of the circle is 2.3 metres.

Angle AOB is 65° .

Find the length of the arc AB.

National 5 Revision Questions

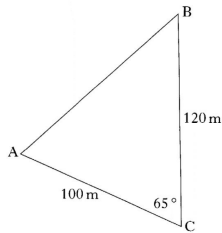
Q85.

- (a) Express $\sqrt{45} - 2\sqrt{5}$ as a surd in its simplest form.
 (b) Express as a fraction in its simplest form

$$\frac{1}{x^2} + \frac{1}{x}, \quad x \neq 0.$$

Q87.

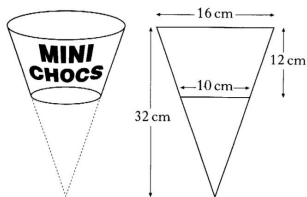
1. The sketch shows a triangle, ABC.



Calculate the area of the triangle.

Q89.

6. A container to hold chocolates is in the shape of part of a cone with dimensions as shown below.



Calculate the volume of the container.
 Give your answer correct to one significant figure.



Q86. A necklace is made of beads which are mathematically similar.



The height of the smaller bead is 0.8 centimetres and its area is 0.6 square centimetres.

The height of the larger bead is 4 centimetres.
 Find the area of the larger bead.

Q88.

- (a) (i) Factorise completely

$$3y^2 - 6y.$$

- (ii) Factorise

$$y^2 + y - 6.$$

- (b) Hence express $\frac{3y^2 - 6y}{y^2 + y - 6}$ in its simplest form.

Q90. (a) Factorise

$$x^2 - 4y^2.$$

- (b) Expand and simplify

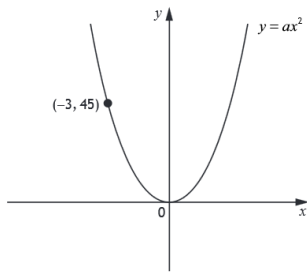
$$(2x - 1)(x + 4).$$

- (c) Expand

$$x^{\frac{1}{2}}(3x + x^{-2}).$$

National 5 Revision Questions

Q91. The diagram below shows part of the graph of $y = ax^2$



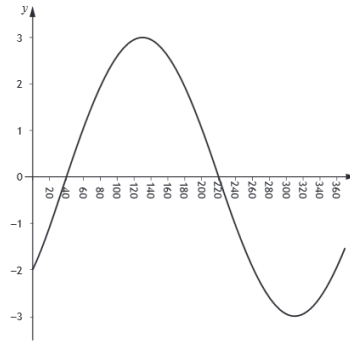
Find the value of a .

1

Q92.

The graph of $y = a \sin(x+b)^\circ$, $0 \leq x \leq 360$, is shown below.

MARKS



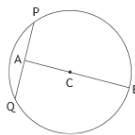
Write down the values of a and b .

2

Q93.

The diagram below shows a circle, centre C .

MARKS



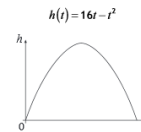
The radius of the circle is 15 centimetres.
 A is the mid-point of chord PQ.
 The length of AB is 27 centimetres.
 Calculate the length of PQ.

4

Q94.

The diagram below shows the path of a small rocket which is fired into the air. The height, h metres, of the rocket after t seconds is given by

MARKS



(a) After how many seconds will the rocket first be at a height of 60 metres? 4

(b) Will the rocket reach a height of 70 metres?
 Justify your answer.

3

Q95.

Two groups of people go to a theatre.
 Bill buys tickets for 5 adults and 3 children.
 The total cost of his tickets is £158.25.

(a) Write down an equation to illustrate this information.

1

(b) Ben buys tickets for 3 adults and 2 children.
 The total cost of his tickets is £98.

Write down an equation to illustrate this information.

1

(c) Calculate the cost of a ticket for an adult and the cost of a ticket for a child.

4

Q96.

The diagram below shows the position of three towns.
 Lowtown is due west of Midtown.

The distance from

- Lowtown to Midtown is 75 kilometres.
- Midtown to Hightown is 110 kilometres.
- Hightown to Lowtown is 85 kilometres.



Is Hightown directly north of Lowtown?

Justify your answer.

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