AMESA 2026

WORKSHOP

Maths Connections:

Strengthening Basics. Elevating Skills.

Senior Phase

SCAN ME

for solutions

www.theanswer.co.za

THE ANSWER SERIES *Your Key to Exam Success*

Algebra

1. Translate each English expression into an algebraic expression.
   Let the unknown number be k.

   1.1 add 7 to a number

   1.2 subtract 2 from a number

   1.3 5 more than a number

2. Translate the following algebraic statements into a verbal description.

   2.1 $w - 1$

   2.2 $2(w + 6)$

3. Consider the following expression:

   $5x^4 - 3x^6 + 2x^2 - x + 7x^5 + 5$

   3.1 Rewrite this expression in order of descending powers of x.

   3.2 How many terms are there in the above expression?

   3.3 What is the coefficient of the x term?

   3.4 What is the degree of the polynomial?

   3.5 What is the difference between the constant term and 2?

4. Simplify the following expression fully:

$$\frac{x^2 - 49}{7x^2 + 49x} \div \frac{2x - 14}{21x}$$

Exponents

1. Fully simplify each of the expressions below.

   1.1 $\sqrt{1+3+5+7} + \sqrt{10^2 - 6^2} - 2 \times \sqrt{2 \times 18}$

   1.2 $(2+3)^2 - (3^2 - 2^2)$

2. Place the following sets of numbers in **ascending** order. Show all your working.

   2.1 $\sqrt{49}$; $\sqrt[3]{-27}$; $\left(\sqrt{5}\right)^2$; $-\sqrt[3]{8}$; 1^4

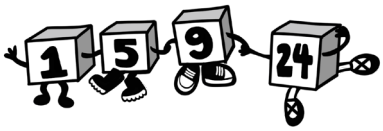
   2.2 $\sqrt[3]{125}$; $-\sqrt{16}$; $\sqrt[3]{8}$; -1^2 ; $\sqrt{81}$

   2.3 4^2 ; -3^2 ; $(-2)^3$; $(-5)^2$; $(-1)^3$

3. Fully simplify each of the expressions below.

   3.1 $\sqrt{3^2 + 3^1 + 3^0 + 3^{-1} + 3^{-2}}$

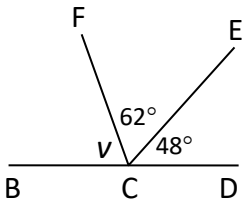
   3.2 $\dfrac{\sqrt{49a^6b^{-2}} \cdot (3a^2b^{-1})^{-2}}{2a^0b^{-3}}$

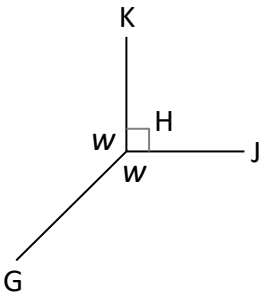


Geometry of Straight lines

Calculate the values of *v* and *w*, giving reasons.

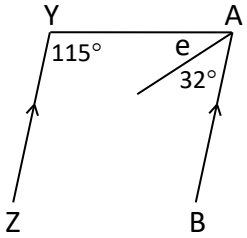
1.2.



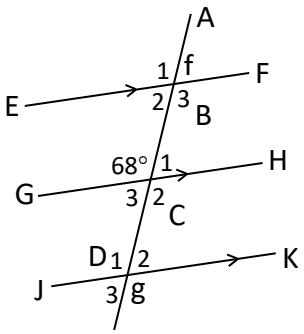


Calculate the values of e, f and g, giving reasons.

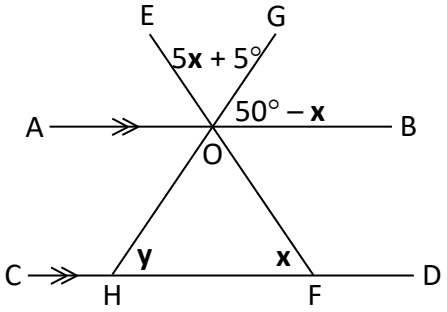
3.1



3.2

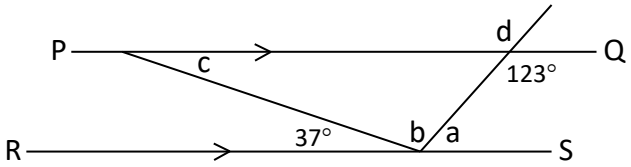


4. Determine the values of *x* and y, giving reasons for your statements.



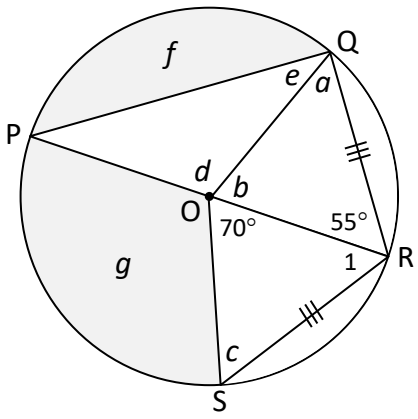
5. In the sketch below, line PQ is parallel to line RS.

   Calculate, with reasons, the unknown angles a, b, c and d.



Geometry of 2D Shapes

1. P, Q, R and S are points on the circle with centre O.



1.1 Name four radii in the diagram.

1.2 Which line is a diameter?

1.3 Name three chords.

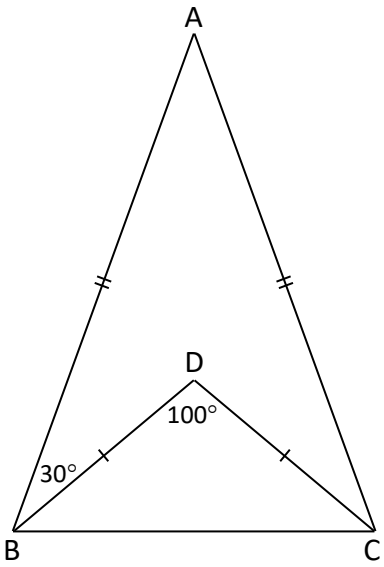
1.4 Match each numbered statement with the correct reason.
For each answer, write the number and corresponding letter.

1	$a = 55°$	A	∠s on a str line POR
2	$b = 70°$	B	∠ sum in ΔOPQ
3	$\hat{R}_1 = c$	C	∠ sum in ΔOQR
4	$c = 55°$	D	∠ sum in ΔOSR
5	$d = 110°$	E	is called a sector
6	$\hat{P} = e$	F	is called a segment
7	$e = 35°$	G	∠s opp equal sides in ΔOQR
8	f	H	∠s opp equal sides in ΔOPQ
9	g	I	∠s opp equal sides in ΔOSR

1.5 Classify both ΔPQR and quadrilateral QOSR.

1.6 Name a pair of congruent triangles.

2.

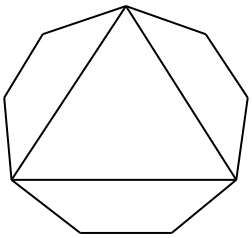


2.1 What type of triangle is ΔABC?

2.2 Determine the size of $\hat{A}$, giving reasons.

Hint:
Calculate the size of $D\hat{B}C$ first.

3. In the figure a regular nonagon is shown.
Three of its diagonals have been drawn in.

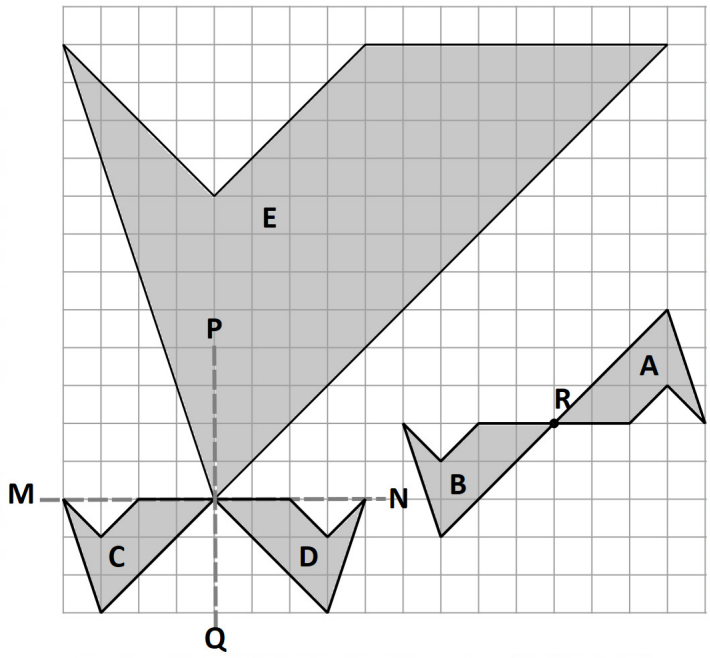


3.1 Calculate the size of an interior angle of the regular nonagon.

3.2 If it is further given that these three diagonals form three isosceles trapeziums, show that these three diagonals form an equilateral triangle.

Transformations

1.



1.1 Describe the following transformations:

1.1.1 Shape **A** to shape **B**.

1.1.2 Shape **B** to shape **C**.

1.1.3 Shape **C** to shape **D**.

1.1.4 Shape **C** to shape **E**.

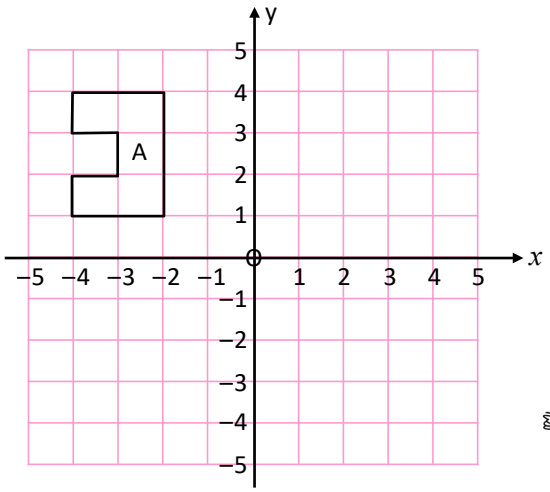
1.2 Which shape is similar, but not congruent, to shape **A**?

1.3 **Rotate** shape **B** 90° clockwise about point **R** to form shape **B'**.

1.4 **Rotate** shape **B** 270° clockwise about point **R** to form shape **B''**.

1.5 **Reflect** shape **C** in the line **MN** to form shape **C'**.

2.



On the same system of axes:

2.1 Draw the reflection of figure A about the x-axis.
Label this figure B.

2.2 Move figure A 5 units right and 4 units down.
Label this figure C.

2.3 Draw the reflection of figure A about the y-axis.
Label this figure D.

3. Sketch the following graphs:

3.1 $y = 3x$

3.2 $y = -x + 5$

Now, sketch the images of these graphs, in each case, writing down the equation of the graph, if they are:

(i) translated 2 units upwards.

(ii) reflected about the y-axis.

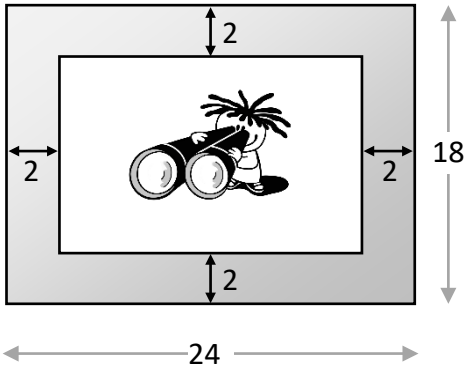
(iii) reflected about the x-axis.

(iv) rotated through 90° anticlockwise about the origin.

Area and Perimeter of 2D Shapes

1. The photo frame has a border with a width of 2 cm.

   The length and breadth of the outer edges of the border are 24 cm and 18 cm respectively.



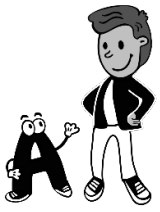
1.1 Calculate the dimensions of the inner edges of the border. (The dimensions are the length and the breadth)

1.2 What is the perimeter of the inner edge of the border?

1.3 Calculate the sum of the inner perimeter and the outer perimeter of the frame.

Extension questions

Calculate

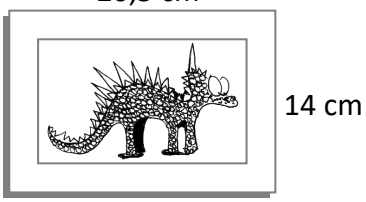


1.4 the area of the shaded part.

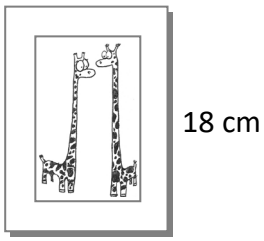
1.5 the ratio of the shaded part to the unshaded part.

2. The following two pictures both have a frame with a width of 2 cm:

A:



B:

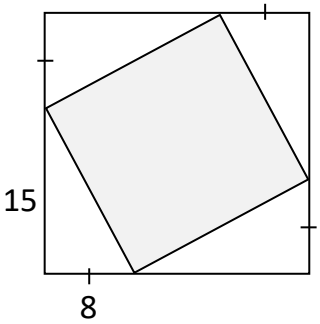


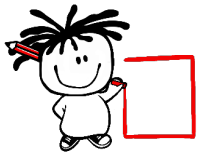
2.1 Which frame has the smallest perimeter?

2.2 Which picture has the largest area?

3. In the figure, two squares are shown.

The smaller shaded square is inscribed on the perimeter of the larger outer square so that it divides each of the sides of the larger square into lengths of 15 and 8 units.



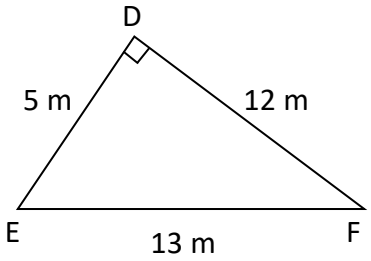


Show by calculations that the area of the smaller shaded square is just a bit more than half the area of the larger outer square.

Area and Perimeter of 2D Shapes

1. Identify the corresponding base and height in the triangle.

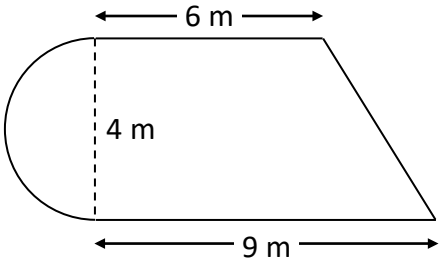
   Then calculate the area of the triangle.



2. The school decides to build a new swimming pool.

   If a swimming pool costs R2 100/m^2, how much will it cost the school to build the swimming pool?

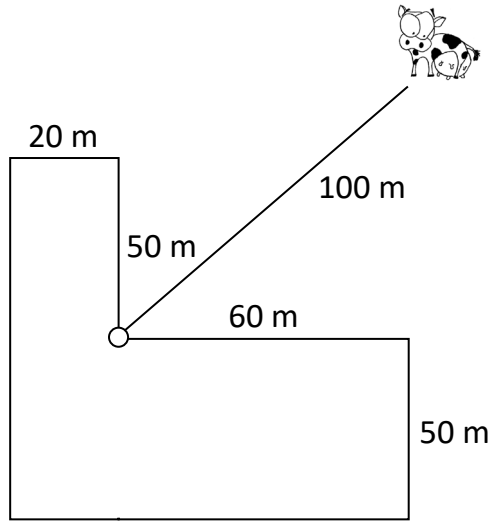
   Use $\pi = 3{,}14$ in this calculation.



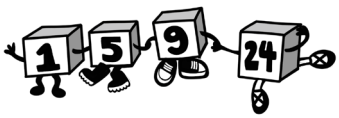
3. A cow is tethered by a 100 m rope to the inside corner of an L-shaped building, as shown in the sketch below.

Find the area that the cow can graze:

[Hint: Use a piece of string as the rope to see how and where it can move!]



Area of circle = πr^2 ➡ Area of a quarter circle = $\frac{\pi r^2}{4}$



Fun Fact

The formula "Area of triangle = $\frac{1}{2} \times$ base $\times \perp$ height"
only works if you have a base and
a corresponding height.

If you are given all three sides, but no height, you can use Heron's formula to calculate the area of the triangle.

Heron's formula

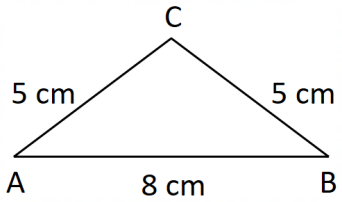
This formula uses the lengths of the sides of a triangle (a, b and c) and half its perimeter s $\left(s = \frac{a+b+c}{2}\right)$.

Area of the triangle = $\sqrt{s(s-a)(s-b)(s-c)}$

ΔABC has sides 5 cm, 5 cm and 8 cm.

Let $a = 5$, $b = 5$ and $c = 8$ and

$s = \frac{5+5+8}{2} = \frac{18}{2} = 9$



$\therefore$ A $= \sqrt{9(9-5)(9-5)(9-8)}$

$= \sqrt{9(4)(4)(1)}$

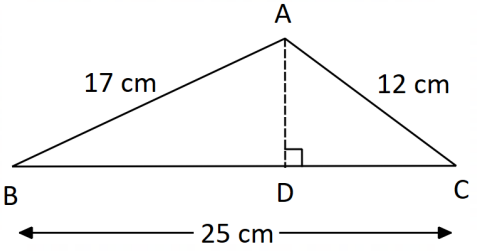
$= \sqrt{144}$

$= 12 \text{ cm}^2$

1. ΔABC has AB = 17 cm, AC = 12 cm and BC = 25 cm.

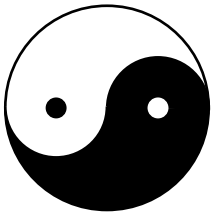
   1.1 Calculate the area of ΔABC without using a calculator.

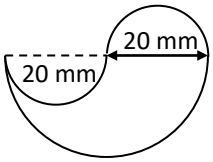
   1.2 Calculate the length of AD.



2. The Yin-Yang symbol below is made up of a black and a white section. The black teardrop shape is given as a sketch with dimensions.

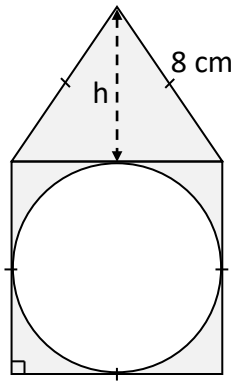
   Determine the perimeter of this teardrop shape. Round the answer off to two decimal places.





3. In the diagram alongside, an equilateral triangle sits on top of a square which has an enclosed circle touching all 4 of its sides.

   Calculate the shaded area, correct to two decimal places, if the height of the triangle, h = 6,93 cm.



Volume and Surface Area of 3D Shapes

1. A rectangular prism has volume 750 cm^3.

   Its dimensions are given as follows:

   length : breadth : height = 3 : 2 : 1

   1.1 What are the dimensions of the prism?

   1.2 Calculate the total surface area of the prism.

2. A rectangular prism with a total surface area of 112 cm^2 has

   length : breadth : height = 4 : 2 : 1.

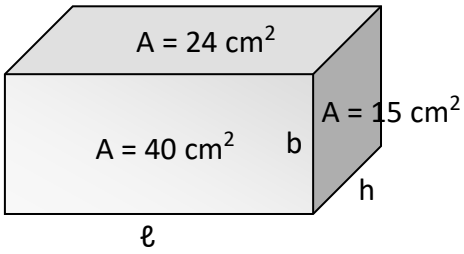
   2.1 What are the dimensions of the prism?

   2.2 Calculate the volume of the prism.

   2.3 What is the capacity of the prism in litres?

3. The area of each face of a box is shown below.

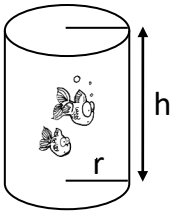
   Find the length, height and width of the box, if each dimension is an integer.



4. A cylindrical fish tank contains 44 litres of water, when it is full.

The tank develops a leak and the water runs out at a rate of $\frac{1}{2}$ litre/minute.

The formula $W = 44 - \frac{1}{2}t$ represents the amount of water that is inside the tank at any time, where t is the time in minutes.



4.1 How long will it take for the tank to empty?

4.2 How much water will be in the tank 62 minutes after it developed the leak?

4.3 If the height of the tank is 35 cm, calculate the radius of a tank which has a volume of 44 litres.

[Hint: 1 litre = 1 000 cm^3]

Notes

Notes

Thank You

THE ANSWER SERIES *Your Key to Exam Success*

MATHS HUB

SCAN ME