Mathematical Reasoning: Practice Exam

https://sites.google.com/view/snedmaths/new-level-1

5

AS 91947

1.4 Demonstrate mathematical reasoning (5 credits)

You should attempt ALL the questions in this booklet.
The resource booklet 91947R should be with this booklet.
Show ALL working.
An approved calculator is allowed for this assessment.

Achievement	Achievement with Merit	Achievement with Excellence	Score	Grade
Demonstrate mathematical reasoning.	Demonstrate mathematical reasoning with relational thinking.	Demonstrate mathematical reasoning with extended abstract thinking.		

Grading information

Each Question

no attempt	relevant attempt	1u	2u	3u	1r	2r	1t	2t
N0	N1	N2	A3	A4	M5	M6	E7	E8

Total

0	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24
not achieved		nearly achieved	low achieved	high achieved	low merit	high merit	low excellence	high excellence
NOT ACHIEVED			ACHIEVED		MERIT		EXCELLENCE	
0-6			7-12		13-18		19-24	

ASSESSOR'S USE ONLY

QUESTION ONE

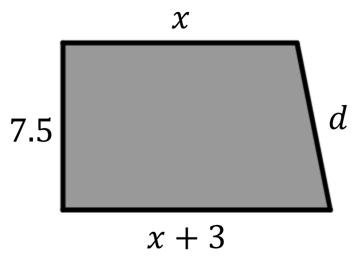
(a) Solve the inequality

$$0.6x + 3 > 0.5x + 11$$

(b) A straight line passes through the points (0,3) and (5,1). Find the equation of the line in the form $y = mx + c$.

ASSESSOR'S USE ONLY

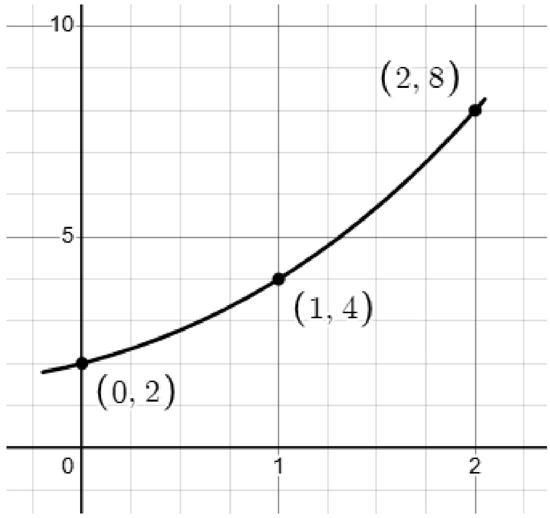
(c) The floor plan of a classroom is in the shape of a trapezium as shown (the diagram not to scale). The dimensions are in metres.



Find the **total perimeter** for which the classroom floor area is 69 square metres.

ASSESSOR'S USE ONLY

(d) The curve shown below could be modelled as either a parabola or an exponential.



$$y = 2^{x+p}$$

$$y = x^2 + x + q$$

Find the values of p and q in these equations, and check these curves fit the points.

ASSESSOR'S USE ONLY

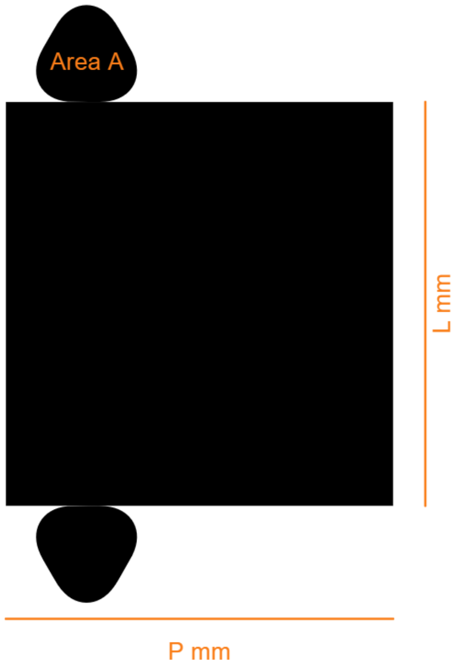
(e) While using his calculator, Jonah notices that when two angles add to 90º, the cosine of one angle is the sine of the other.

For example, $\cos 43° = 0.682 = \sin 47°$.

Use a right-angle triangle to explain why this is always true.

ASSESSOR'S USE ONLY

(f) The cross-sectional area of a piece of licorice candy is $A = 20\ \text{mm}^2$, and the perimeter of this area is $P = 24\ \text{mm}$. It is as a prism with a rounded triangle cross-section. The net is shown below (not to scale).



The total surface area is $640\ \text{mm}^2$. Calculate the volume.

ASSESSOR'S USE ONLY

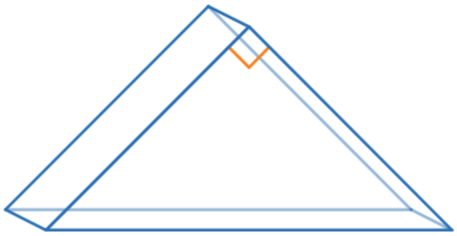
QUESTION TWO

(a) Use algebraic reasoning to find the point where the lines $y = 3x - 11$ and $y = \frac{1}{2}x + 4$ intersect.

(b) A glass triangular prism is shown below. The triangular faces are right-angled, with two sides length 45 mm. The prism is 9 mm thick.

One cubic centimetre of glass has a mass of 2.525 grams.

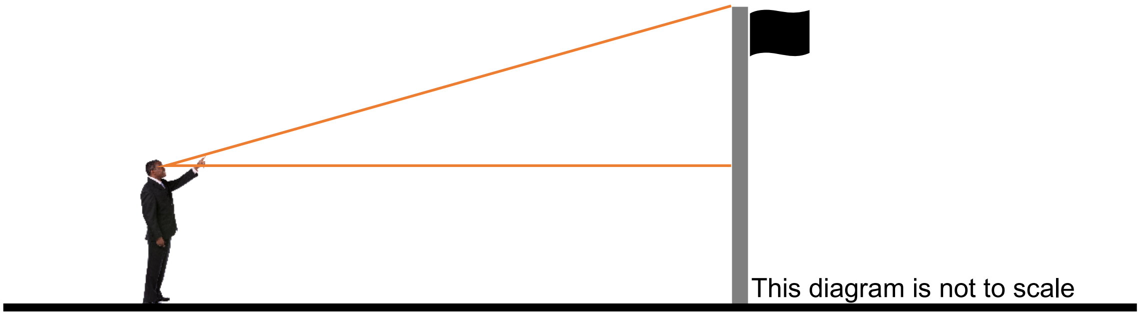
Calculate the mass of the glass prism.



ASSESSOR'S USE ONLY

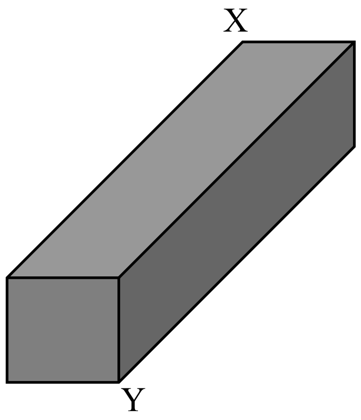
(c) Caleb stands 25 metres away from a flagpole, and uses a clinometer to measure the angle of elevation to the top of the flagpole as 18.5º. Caleb's eyes are 1.64 metres above the level ground.

What percentage of the flagpole is below Caleb's eye level?



ASSESSOR'S USE ONLY

(d) A box with square ends 1.7 metres long, and the long diagonal inside the box (from corner X to corner Y) is 1.9 metres.

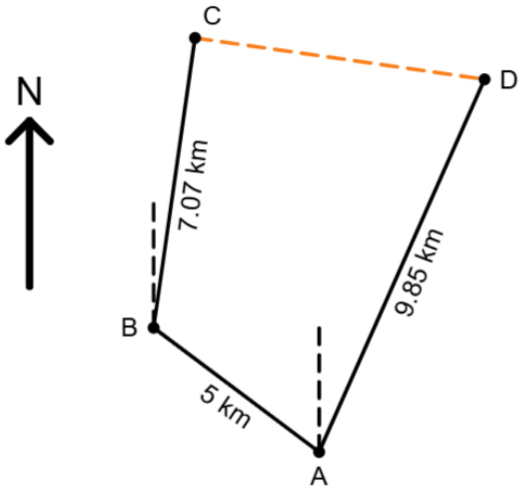


Calculate the volume of the box.

ASSESSOR'S USE ONLY

(e) The diagram shows four points in a national park. Three bearings are known between these points.

- from A to D, 9.85 km bearing 024º
- from A to B, 5 km bearing 307º
- from B to C, 7.07 km bearing 008º



Find the distance and bearing from C to D.

ASSESSOR'S USE ONLY

(f) Solve the equation below for x.

$$b^{-8}(ab)^x = \left(\frac{a}{b}\right)^x.$$

Show clearly your algebraic working.

ASSESSOR'S USE ONLY

QUESTION THREE

(a) The Great Pyramid of Giza is 138.5 metres tall, and the perimeter of the square base is 921 metres.

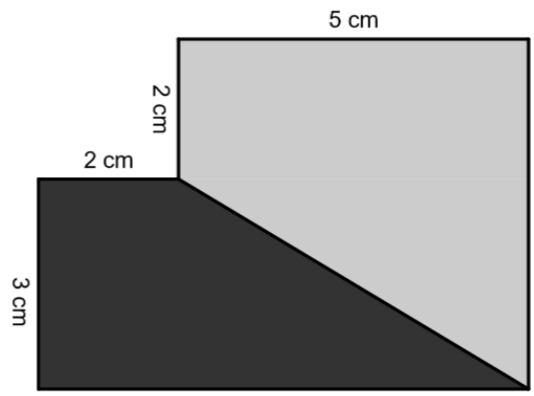
Calculate its volume in cubic metres.

(b) The first four terms of a sequence are $7, 11, 15, 19, \ldots$

Find the 16th term of the sequence.

ASSESSOR'S USE ONLY

(c) Find the ratio of the of the shaded areas (dark : light) of the diagram below.



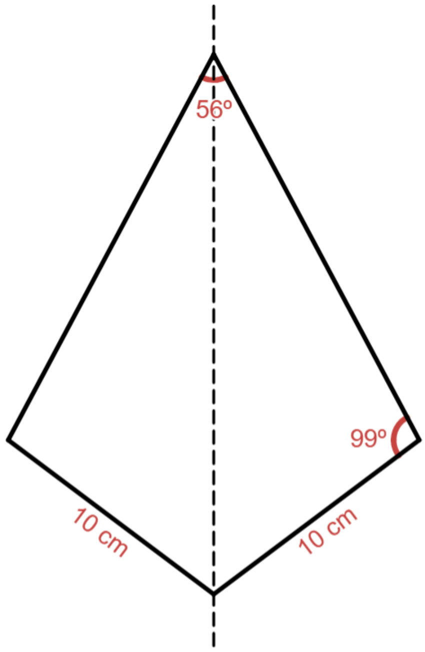
Write the ratio in integer form.

(d) Solve the equation $x(2x + 1) = 10$.

Show algebraic working in your answer.

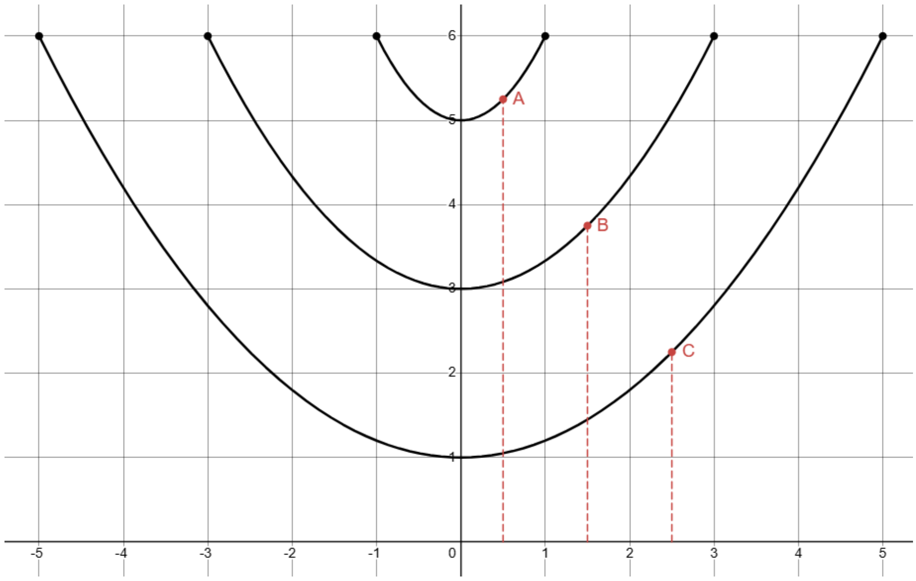
ASSESSOR'S USE ONLY

(e) Find the perimeter and area of this kite. The dashed line is an axis of symmetry.



ASSESSOR'S USE ONLY

(f) The graph below shows three parabolas and three points on these parabolas.



The parabolas have equations:

$y = x^2 + 5$ $\quad$ $y = kx^2 + 3$ $\quad$ $y = \frac{1}{5}x^2 + 1$

The points shown on the parabolas are:

$A = (0.5, 5.25)$ $\quad$ $B = (1.5, b)$ $\quad$ $C = (2.5, c)$

- Find the values of k, b and c.
- Determine whether B is halfway between A and C.

ASSESSOR'S USE ONLY