Test 3 - Pythag, Measurement and Similarity Solutions

Thursday, May 19, 2022 6:19 AM

2022 Yr 11 Apps Test...

NAME:

Response Item: Test 3 – Pythagoras, Measurement, and Similarity
Year 11 Applications Mathematics

Total: /56

%

Resource Rich Assessment
Time: 55 Minutes

Material required/recommended for this test

To be provided by the supervisor

Question/answer booklet, and formula sheet.

To be provided by the candidate

Standard items: pens, pencils, pencil sharpener, highlighter, eraser, ruler
Special materials: drawing instruments, templates, notes on a maximum of **one single sided** unfolded sheet of A4 paper, up to three calculators (CAS, graphics or scientific)

Important note to candidates

No other items may be taken into the test room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the test room. If you have any unauthorised material with you, hand it to the teacher **before** reading any further.

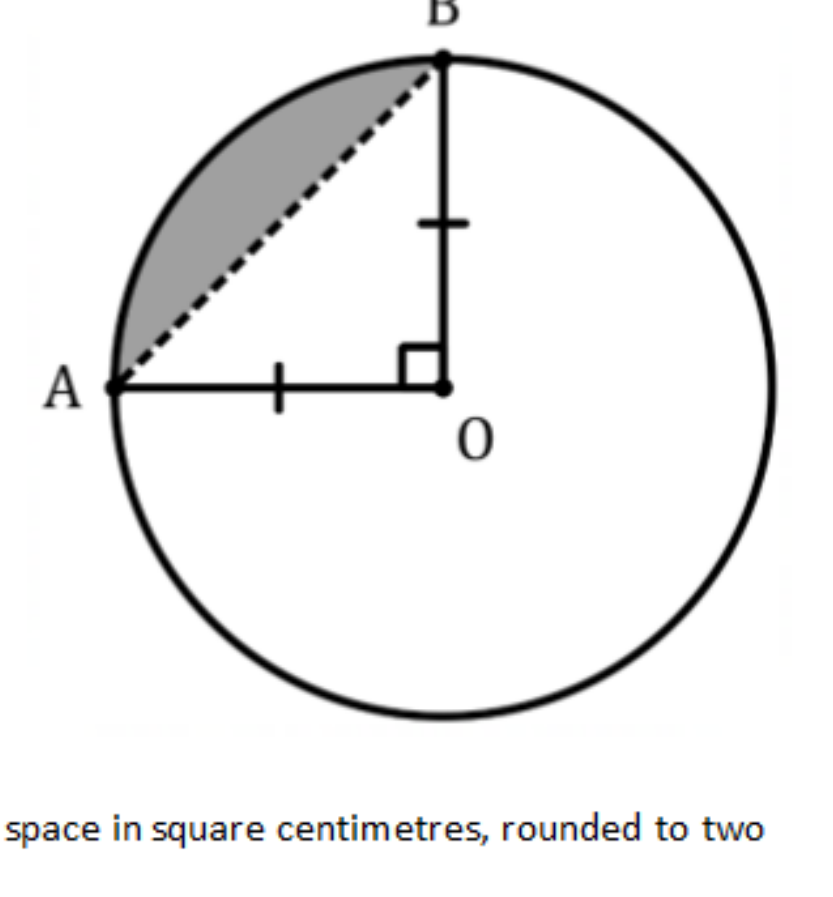
Although marks are not necessarily awarded for working, it is recommended that **enough working to justify** your responses is shown. Incorrect answers with no working will be awarded **zero** marks.

[12 marks – 4, 4, 4]

1. The circle below has a right-isosceles triangle within it. A segment in the sector has been shaded grey.

Of the three vertices of the triangle, A and B lie on the circumference of the circle, while the third vertex, O, is the centre of the circle.

Length $AO = BO = 0.04\ m$



a) Determine the area of the grey shaded space in square centimetres, rounded to two decimal places:

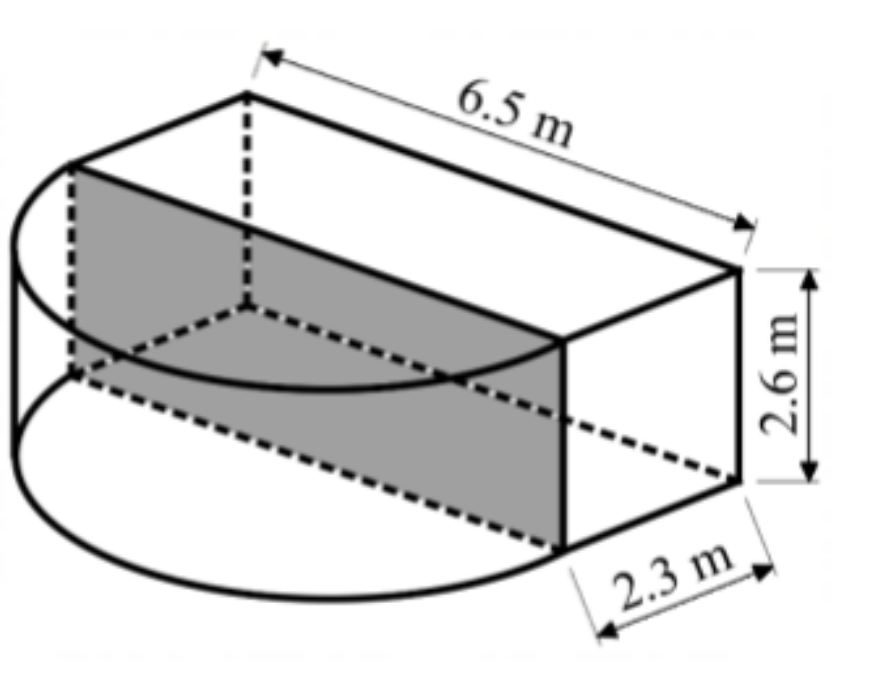
b) Determine the perimeter of the grey shaded space:

c) This diagram was scaled up by a factor of 1.8, determine the new perimeter and area of the shaded space:

[8 marks – 2, 3, 3]

2. A farmer uses an old, water-proofed sea container as a water tank to collect and hold water for his cattle. The roof has been removed to allow water in when it rains.

The farmer plans to remove a wall (indicated in grey in the diagram) and build a half-cylinder extension onto it to increase the capacity of the water tank.



a) Calculate the volume of this sea container before the half-cylinder extension:

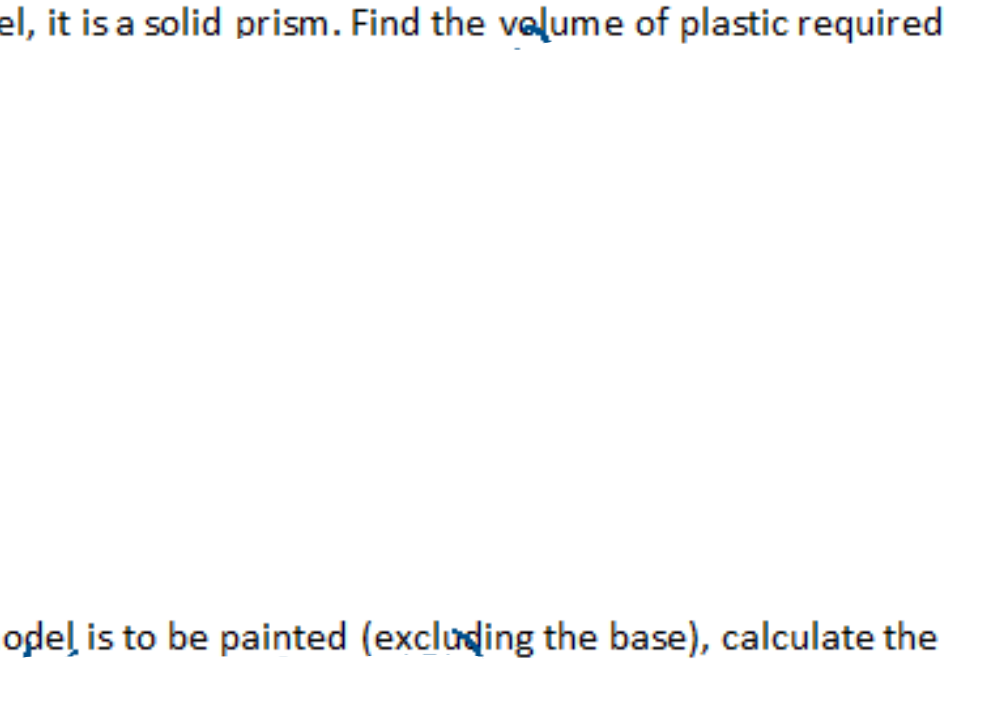
b) By how many kilolitres has the farmer increased the capacity of his water tank with this extension?

c) The farmer will need to waterproof this extension. Calculate the area to be waterproofed in square meters (note that only the external wall and floor of the half cylinder need waterproofing):

[10 marks – 2, 3, 3, 2]

3. The diagram below shows the outer dimensions of a train station shelter on a model train set.

a) Show mathematically that the height of the model is $4\ cm$:



b) As this shape is a plastic model, it is a solid prism. Find the volume of plastic required to make this model in cm^3:

c) The external surface of the model is to be painted (excluding the base), calculate the area to be painted in cm^2:

d) The real-life shelter this model is based off is 50 times larger. Calculate the area of sheet metal required to cover the real-life frame (excluding the base) in m^2:

[17 marks – 4, 8, 5]

4. A top-down view of a backyard design with an in-ground pool is shown below. The shaded area represents the area to be grassed, the cross-hatched area will be tiled.

$BC = 10\ m$, $AD = 12\ m$ and $BE = 3.75\ m$

a) A landscaping company charges $22 per square meter to supply and lay grass. Determine the cost for this company to grass the shaded area:

b) The remaining area around the pool is to be tiled (cross-hatched area). The company chosen charges $90 per square meter plus a surcharge of $30 per **linear** meter for any **curved** edges to be tiled around.

i. Determine the area to be paved in square meters

ii. Determine the length of curved edge bordering the paving in meters

iii. Using your answers to i and ii, determine the cost of paving this area

c) In Perth exposed water surfaces lose water to evaporation at an average rate of $5\ mm$ a day.

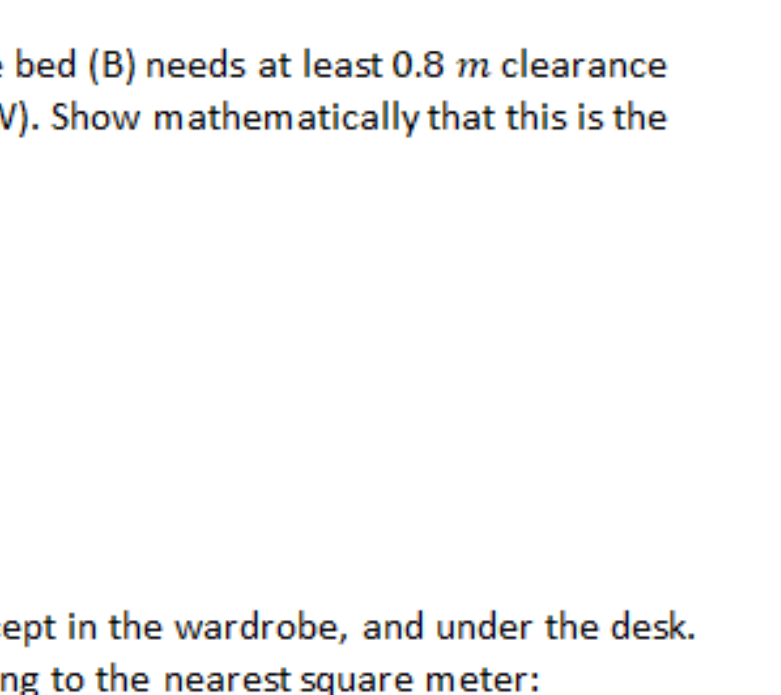
i. Calculate the area of water exposed to the air in the pool

ii. Hence determine the number of litres this pool would lose to evaporation on an average day:

[9 marks – 2, 3, 4]

5. The plan of a child's bedroom is shown to the right with a scale of $1:60$.

The plan has a built-in wardrobe (W) and built-in quarter-circle desk with storage (D). The interior designer would like to place a king single bed in the room (B).



a) Determine the actual dimensions of the wardrobe in centimetres:

b) To move around the room comfortably, the bed (B) needs at least $0.8\ m$ clearance with both the desk (D) and the wardrobe (W). Show mathematically that this is the case:

c) The room is to be carpeted everywhere except in the wardrobe, and under the desk. Determine the area to be carpeted answering to the nearest square meter:

End of Test