

Name: SOLMS

GEOMETRY AND TRIGONOMETRY REVIEW

Paper 1 Questions

Question 1

[Maximum mark: 6]

Consider the line L1 with equation $y = -3x + 9$

- a) The point $(a, 4)$ lies on the line L1. Find the value of a [2]
b) The point $(12, b)$ lies on the line. Find the value of b [1]

Line L2 has equation $2x - y + 3 = 0$

- c) Find the point of intersection between L1 and L2 [3]

a) $y = -3x + 9$
 $4 = -3a + 9$ m1
 $a = \frac{5}{3}$ A1

b) $b = -3(12) + 9$ m1
 $b = -27$ A1

c) use
line solve

$(\frac{6}{5}, \frac{27}{5})$

$(1.2, 5.4)$
A1 A1

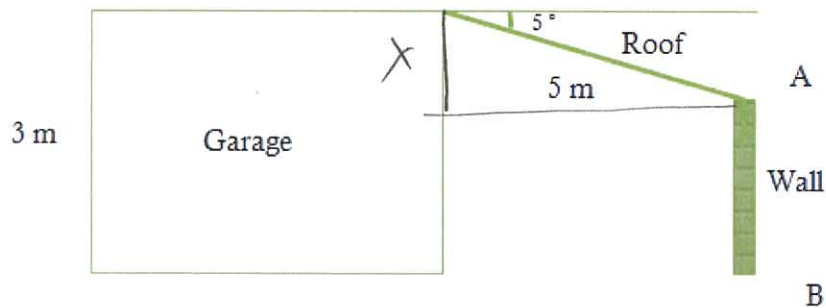
Question 2

[Maximum mark: 6]

Carl is building a car port on the side of his garage. His garage is 3 m high and the piece of roof that he wants to use is 5 m long.

Carl wants the angle depression of the roof from the top of the garage to be 5° so that rainwater drains off it effectively.

- a) How high must he build the wall, AB, at the opposite end of the roof? [3]
b) How far away from the garage must he build this wall? [2]
c) Carl's car is 2.1 m wide and 1.65 m tall. Will it fit inside this new car port? [1]



$$a) x = 0.435777 \text{ m}$$

$$AB = 3 - x = 2.56 \text{ m}$$

A | A |

$$b) 4.98 \text{ m (m) A |}$$

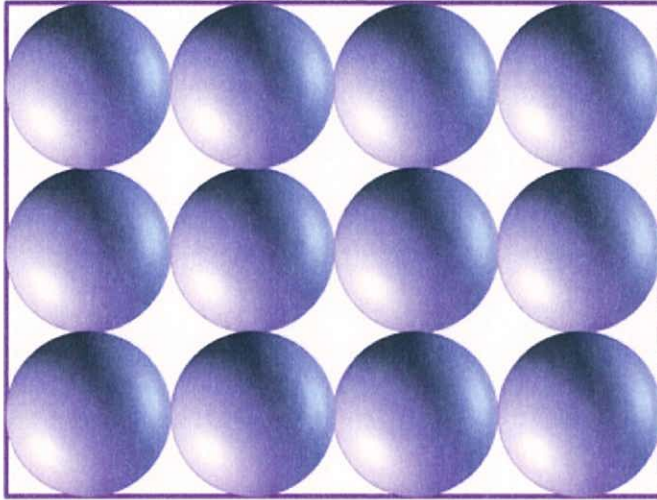
$$c) \text{ yes A |}$$

Question 3

[Maximum mark: 6]

For this question you are required to give your answers to the nearest cubic millimetre.

12 golf balls are arranged in a box as shown below.



Each golf ball has a radius of 21 mm.

- (a) Find the volume of one golf ball [2]
(b) Write down the volume of 12 golf balls [1]

The box is designed so that the 12 golf balls fit perfectly into the box.

- (c) Calculate the volume of the box [2]
(d) Calculate the volume of empty space in the box [1]

$$\begin{aligned} \text{a) } v_1 &= \frac{4}{3} \pi (21)^3 \text{ ml} \\ &= 33792 \text{ mm}^3 \text{ A1} \end{aligned}$$

$$\text{b) } 12v_1 = 405504 \text{ mm}^3 \text{ A1}$$

$$\text{c) } 3 \times 21 \times 6 \times 21 \times 42 = 339056 \text{ mm}^3 \text{ A1}$$

$$\text{d) } 423547 \text{ mm}^3 \text{ A1}$$

Question 4

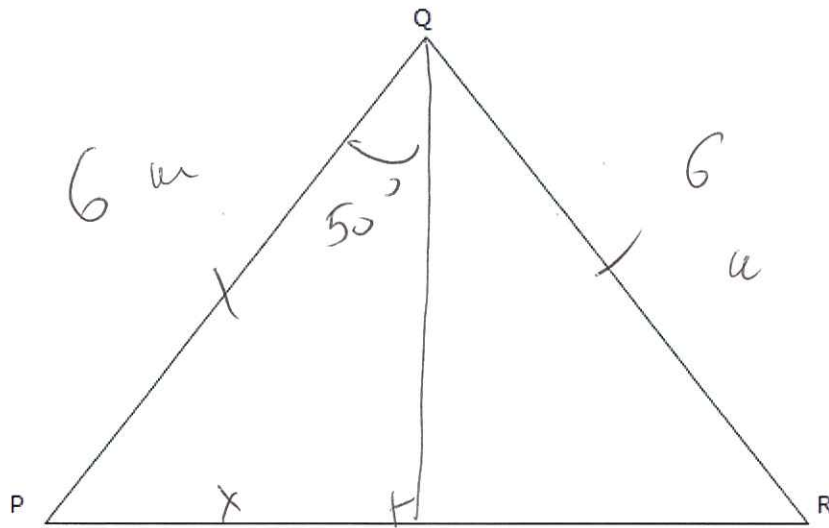
[Maximum mark: 6]

The diagram below shows an isosceles triangular roof gable end PQR

PQ = 6 m, angle PQR = 100°

a) Find length PR [3]

b) Find the area of triangle PQR [3]



$$a) \sin 50^\circ = \frac{x}{60} \quad \text{m l A 1}$$

$$PR = 2x = 9.19 \text{ m} \quad \text{A 1}$$

$$b) \frac{1}{2} \times 6 \times 6 \times \sin 100^\circ = (7.7 \text{ m})^2 \quad \text{A 1}$$

Question 5

[Maximum mark: 6]

The line L1 has equation $2x + 3y = 26$. The line L2 passes through the origin O and is perpendicular to L1

(a) Find an equation for the line L2 [4]

(b) Find the coordinates for the point of intersection of L1 and L2 [2]

$$a) \quad 3y = -2x + 26$$

$$y = -\frac{2}{3}x + \frac{26}{3}$$

$$m_1 = -\frac{2}{3} \text{ m1 A1}$$

$$m_2 = \frac{3}{2} \text{ m1}$$

$$y = \frac{3}{2}x \text{ A1}$$

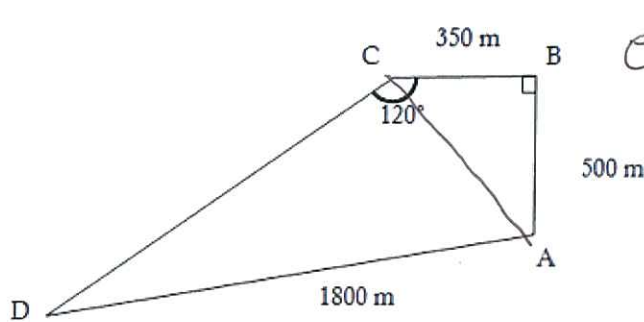
$$b) \quad (4, 6) \text{ use lin solve}$$
$$A1 \quad A1$$

Paper 2 Questions

Question 6

[Maximum mark: 16]

A cross-country running course is given in the diagram below. Runners start and finish at point A



e) $350 + 500 + 1300 + 1370 = 4620 \text{ A1}$

$\frac{4620}{5} = 924 \text{ A1}$

$\frac{924}{60} = 15.4 \text{ A1}$
[2] min

- (a) Find the distance CA [2]
- (b) Find the angle BCA correct to the nearest degree [2]
- (c) (i) Calculate the angle CAD [2]
- (ii) Calculate the distance CD [5]
- (d) Calculate the area enclosed by the course ABCD [4]
- (e) Angela runs at a speed of 5 m s^{-1} . Calculate the time, in minutes, taken for her to complete the course [3]

a) $CA = \sqrt{350^2 + 500^2} = 610 \text{ m}$ A1

b) $\tan^{-1}\left(\frac{350}{500}\right) = 35^\circ$
 $90 - 35 = 55^\circ$ A1

d) $\frac{1}{2} \times 500 \times 350 + \frac{1}{2} \times 610 \times 1300 \sin(97.1^\circ) = 632290 \text{ m}^2$ A1

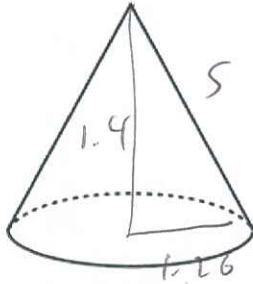
c) $\frac{610}{\sin D} = \frac{1300}{\sin 65^\circ} \Rightarrow D = 17.33^\circ$
 $\angle CAD = 97.1^\circ$ A1

(ii) $\frac{CD}{\sin(97.1^\circ)} = \frac{1300}{\sin(65^\circ)}$ A1
 $CD = 1970 \text{ m}$ A1

Question 8

[Maximum mark: 12]

Martha designs play tents for children. She has created a pattern based upon a right cone. She has decided upon a base area of 5m^2 and she would like the tent to be 1.4m high.



- a) Find the radius of the base of the play tent [2]
- b) Find the angle between the base of the play tent and the sides of the tent [2]
- c) Find the angle at the vertex of the tent [2]

Martha has found the material she would like to use to make the play tents. The cost of the material is 8.50 GBP per square metre.

- d) Write down an expression for M the amount of fabric needed to construct the tent in terms of r , the radius of the base and h the height of the tent [3]
- e) How much does the material cost for one tent? [3]

a) $\pi r^2 = 5 \text{ m}^2$

$r = 1.26 \text{ m}$

b) $\tan^{-1}\left(\frac{1.4}{1.26}\right) = 48.0^\circ$

c) $84^\circ \text{ (m)} \text{ m}^2$

d) $(\pi r s + \pi r^2) \times 8.50$

e) $m \text{ (A)} \quad \text{A}$

$S = \sqrt{1.26^2 + 1.4^2} \text{ m} \text{ m}^2$

e) 106.313 A

Question 7

[Maximum mark: 19]

The vertices of quadrilateral ABCD are A (1, 3), B (-1, 2), C (-2, -4) and D (3, -2)

(a) Calculate the gradient of line CD [2]

(b) Show that line AD is perpendicular to line CD [3]

(c) Find the equation of line CD. Give your answer in the form

$ax + by = c$ where $a, b, c \in \mathbb{Z}$ [3]

Lines AB and CD intersect at point E

(d) Find the coordinates of E [5]

(e) Find the distance between A and D [3]

The distance between D and E is $\sqrt{4176}$

(f) Find the area of triangle ADE [3]

a) $m_{CD} = \frac{-2 - (-4)}{3 - (-2)} = \frac{2}{5} \text{ m. AD}$

b) $m_{AD} = -\frac{5}{2} \text{ m. AD}$

$\frac{2}{5} \times -\frac{5}{2} = -1 \therefore \perp$

c) $y = \frac{2}{5}x + c \text{ m. AD}$

$y = \frac{2}{5}x - \frac{16}{5} \text{ AD}$

$2x - 5y = 16 \text{ AD}$

d) $E(-5, -2)$

line AD

$y = \frac{1}{2}x + \frac{5}{2}$

and

$y = \frac{2}{5}x - \frac{16}{5}$

e) $\sqrt{5^2 + 2^2} = 5.39 \text{ m. AD AD}$

f) $A = \frac{1}{2} \sqrt{4176} \times \sqrt{20}$
 $= 179 \text{ AD}$