Name: _____

Year 9 Stage 5.3 Mathematics
Assignment Term 3 2022

Indices & Trigonometry		
Task number: 3	**Weighting: 25%**	**Due Date: 02/09/2022**

Outcomes assessed:

MA5.3-6NA performs operations with surds and indices

MA5.3-15MG applies Pythagoras' theorem, trigonometric relationships, ~~the sine rule, the cosine rule and the area rule to solve problems~~, including problems involving three dimensions

Nature and description of the task:

As a result of completing this Assignment, students should be familiar with the topics:

- Indices and Surds - index laws for multiplying, dividing, power of a power, zero power, negative indices, scientific notation, significant figures, fractional indices and simple operations with surds.
- Trigonometry - Pythagoras' Theorem to find hypotenuse and short sides, 2D and 3D Pythagoras problems, trigonometric ratios, finding unknown sides, solving for the denominator, finding unknown angles and bearings.

On the 2nd of September 2022 you will receive a similar selection of questions from the Preparation Activity to complete in 50 minutes in an in-class Validation Task. You are expected to investigate/attempt each of these questions before the in-class Validation Task. The final mark for this assessment will be the mark you receive on the in-class Validation task.

NOTE: You will NOT have access to the Preparation Activity during the Validation Task. You will NOT be given any answers to the Preparation Activity.

Non-Completion of Task:

If you know you are going to be away on the day the Assessment Task is due and are unable to hand in the Assignment on the due day, then you must have supportive documentation.

Preparation Activity

Indices & Surds

1 Simplify the following using index laws:

a $m^2 \times m^3$

b $2rs^3 \times 3r^4s \times 2r^2s^2$

c $m^{15} \div m^9$

d $\frac{8st^4}{2t^3}$

e $(3x^4)^2$

f $8x^0 - 5$

g f^{-3}

h $\frac{9x^2y^3 \times 6x^7y^5}{12xy^6}$

2 Simplify and express using positive indices.

$$\frac{2a^3b^2}{a^{-3}} \times \frac{2a^2b^5}{b^4}$$

3 Write these numbers using scientific notation.

a 43 000

b 0.00000056

4 Write these numbers using scientific notation, correct to three significant figures.

a 0.002434

b 72 477

5 Express the following in surd form and evaluate where possible.

a $7^{\frac{1}{3}}$

b $36^{\frac{1}{2}}$

6 Simplify the following surds.

a $2\sqrt{7} + 6\sqrt{3} + 3\sqrt{7} - 5\sqrt{3}$

b $\sqrt{2} + \sqrt{50}$

c $\sqrt{2} \times \sqrt{13}$

d $18\sqrt{20} \div 3\sqrt{2}$

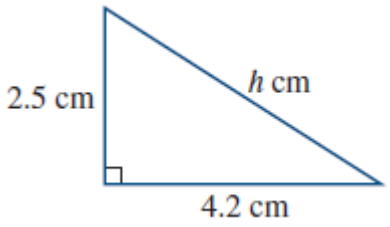
e $2\sqrt{3}(7\sqrt{6} + 5\sqrt{3})$

f $(2\sqrt{7})^2$

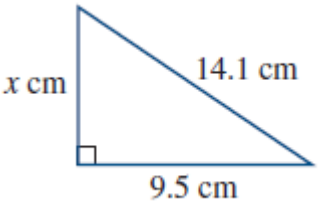
Trigonometry

7 Find the value of the pronumerals.

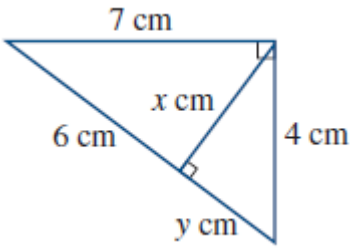
a



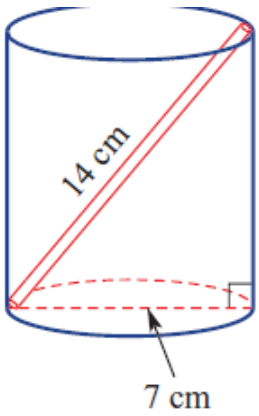
b



8 Find the value of the pronumerals.

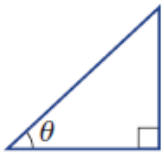


9 A 14 cm drinking straw just fits into a can as shown. The diameter of the can is 7 cm. Find the height of the can correct to 2 decimal places.



10 Label the sides *opposite (o), adjacent (a) & hypotenuse (h)* in relation to θ.

a



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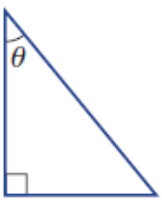
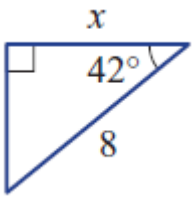


11 For each of the triangles below find the value of x, correct to 2 decimal places.

a



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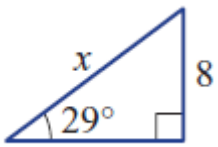
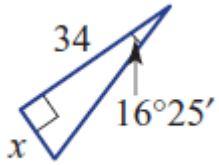
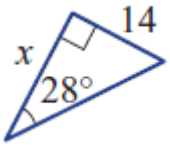


c

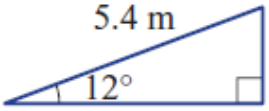


d

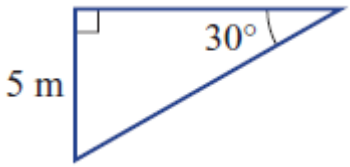


12

Amy walks 5.4 m up a ramp that is inclined at 12° to the horizontal. How high (correct to two decimal places) is she above her starting point?

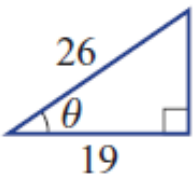


13 Find the <u>perimeter</u> of this triangle.



14 For each of the triangles below find the value of θ, rounded to the nearest minute.

a



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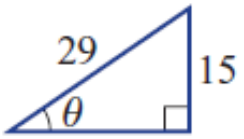

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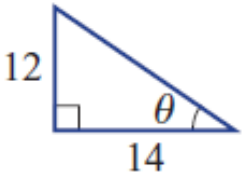
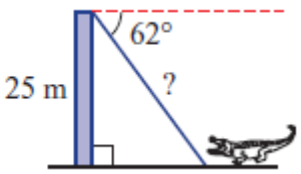
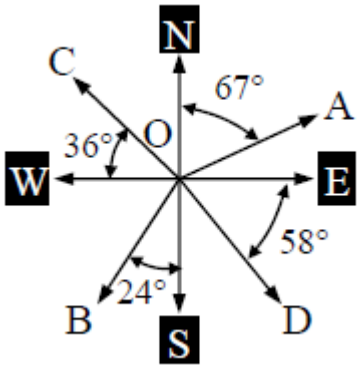


15 The angle of depression from the top of a 25 metre tall viewing tower to a crocodile on the ground is 62°. Find the direct distance from the top of the tower to the crocodile, to the nearest centimetre.



16 Find the value of the true bearings for A, B, C & D below.



A _____

B _____

C _____

D _____

17 A ship travels due south for 3km, then on a bearing of 130° for 5km.

a Draw a diagram representing this information.

b Find how far east the ship is from its starting point, correct to 2 decimal places.

c Find how far south the ship is from its starting point, correct to 2 decimal places.

Answers

1 a m^5

b $12r^7s^6$

c m^6

d $4st$

e $9x^8$

f 3

g $\frac{1}{f^3}$

h $\frac{9x^8y^2}{2}$

2 $4a^8b^3$

3 a 4.3×10^4

b 5.6×10^{-7}

4 a 2.43×10^{-3}

b 7.25×10^5

5 a $\sqrt[3]{7}$

b 6

6 a $5\sqrt{7} + \sqrt{3}$

b $6\sqrt{2}$

c $\sqrt{26}$

d $6\sqrt{10}$

e $42\sqrt{2} + 30$

f 28

7 a 4.9 cm (1dp)

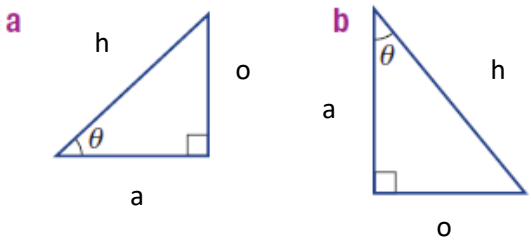
b 10.4 cm (1dp)

8 x = 3.6 cm (1dp)

y = 1.7 cm (1dp)

9 12.12 cm

10



11 a 5.9 (1dp)

b 16.5 (1dp)

c 10.0 (1dp)

d 26.3 (1dp)

12 1.12 m (2dp)

13 23.66 m (2dp)

14 a 43°3′

b 31°9′

c 40°36′

15 28 m

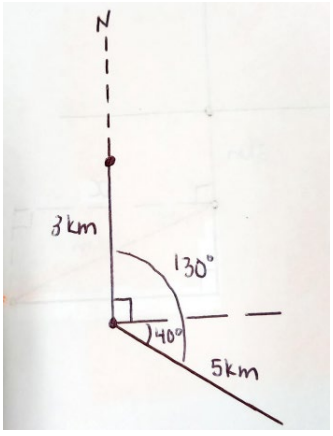
16 a 067°*T*

b 204°*T*

c 306°*T*

d 148°*T*

17 a



b 3.83 km

c 6.21 km