Year 10 Term 3 Homework

Student Name: _____	**Grade**: _____
Date: _____	**Score**: _____

Table of contents

This edition was printed on June 16, 2011.

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3 Year 10 Term 3 Week 3 Homework

3.1 Further trigonometry

3.1.1 Trigonometric rations of obtuse angles

If θ is an acute angle, then:

- $\sin(180^\circ - \theta) = \sin\theta$
- $\cos(180^\circ - \theta) = -\cos\theta$
- $\tan(180^\circ - \theta) = -\tan\theta$

Exercise 3.1.1 State whether the angle θ is acute or obtuse, where $0^\circ < \theta^\circ < 180^\circ$, if:

1. $\sin\theta > 0$ *and* $\tan\theta > 0$ _____
2. $\cos\theta > 0$ *and* $\tan\theta > 0$ _____
3. $\tan\theta < 0$ *and* $\cos\theta < 0$ _____

Exercise 3.1.2 Express each of the following trigonometric ratios on terms of an acute angle, then evaluate, correct to 2 decimal places.

1. $\tan 159^\circ$ _____
2. $\cos 132^\circ$ _____
3. $\sin 168^\circ$ _____

Exercise 3.1.3 For each of the following, find θ, where $0^\circ < \theta^\circ < 180^\circ$. Answer correct to the nearest degree.

1. $\cos\theta = -0.208$ _____
2. $\tan\theta = -2.356$ _____
3. $\sin\theta = 0.837$ _____

Exercise 3.1.4 Consolidation

1. *Find the obtuse angle θ, correct to the nearest degree.*

   (a) $\tan\theta = -1.2799$

   (b) $\cos\theta = -0.6906$

   (c) $\cos\theta = -0.1947$

2. *Find the exact value of each trigonometric ratio, without using a calculator.*

   (a) $\sin 135^\circ$

   (b) $\tan 150^\circ$

   (c) $\cos 120^\circ$

3. *Prove the following identities:*

   (a) $\frac{\cos(180^\circ-\theta)\sin\theta}{\sin(180^\circ-\theta)} = -\cos\theta$

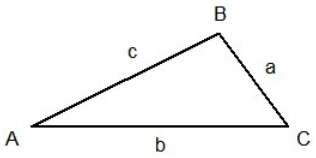
   (b) $\tan(180^\circ-\theta)\sin(90^\circ-\theta) = -\sin\theta$

   (c) $\tan(180^\circ-\theta)\tan(90^\circ-\theta) = -1$

   (d) $\frac{\cos(90^\circ-\theta)}{\cos(180^\circ-\theta)} = -\tan\theta$

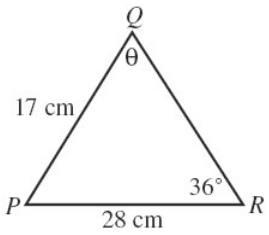
3.1.2 The Sine Rule

- The Sine rule states that in any triangle ABC: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$.
- The sine rule can be used to find the length of a side if given one side and two angles.
- The sine rule can also used to find the size of an angle if given one angle and two sides.

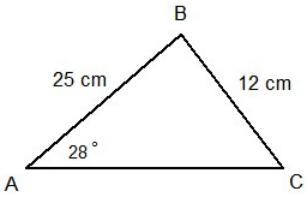


Exercise 3.1.5

1. *Find the size of the acute angle θ, correct to the nearest minute.*



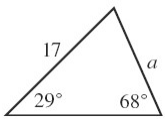
2. *In $\triangle ABC$, $\angle A = 28°$, $BC = 12\,cm$ and $AB = 25\,cm$. Find the two possible values for $\angle C$, correct to the nearest degree. Hence show that there are two possible triangles.*



Exercise 3.1.6 Find the value of the pronumeral in each of these triangles, correct to 1 decimal place. All lengths are in cm.

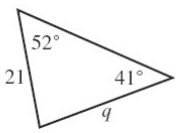
a. $a =$ _____

a



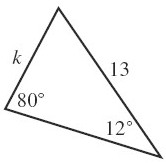
b. $q =$ _____

b



c. $k =$ _____

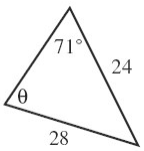
c



Exercise 3.1.7 Find the size of the acute angle θ, correct to the nearest degree:

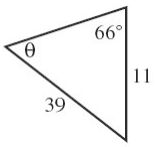
a. $\theta =$ _____

a



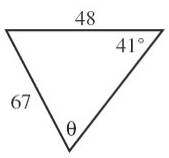
b. $\theta =$ _____

b



c. $\theta =$ _____

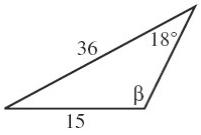
c



Exercise 3.1.8 Find the obtuse angle β in each of these triangles, correct to the nearest degree:

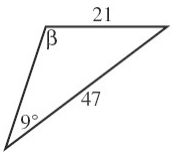
a. β = _____

a



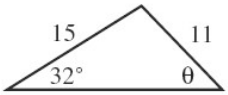
b. β = _____

b

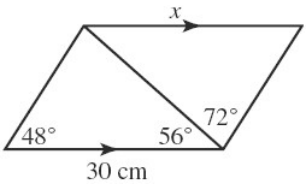


Exercise 3.1.9

1. *Find the two possible sizes for the angle θ, correct to the nearest degree.*



2. *Find the value of x, correct to 1 decimal place.*



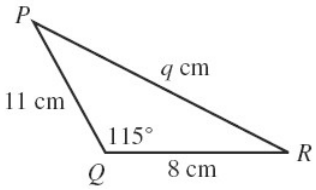
3.1.3 The Cosine Rule

The Cosine Rule states that in any triangle ABC:

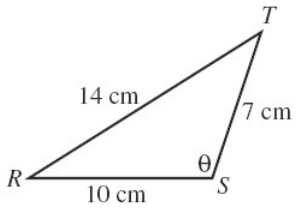
- $a^2 = b^2 + c^2 - 2bc\cos A$
- The Cosine Rule can be used to find the length of a side if given two sides and the included angle.
- The Cosine Rule can be used to find the size of an angle if given three sides. $\cos A = \frac{b^2+c^2-a^2}{2bc}$

Exercise 3.1.10

1. *Find the value of the pronumeral, correct the 1 decimal place.*

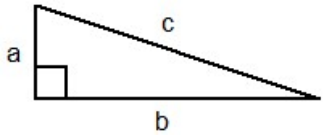


2. *Find the angle θ in the triangle given below, correct to the nearest minute.*

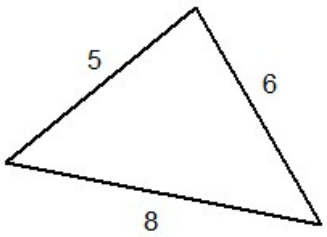


Exercise 3.1.11

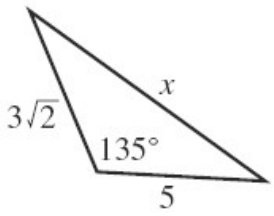
1. *Use the Cosine Rule to find an expression for c^2 in terms of a and b. What happens to the Cosine Rule for sides when the included angle is a right angle?*



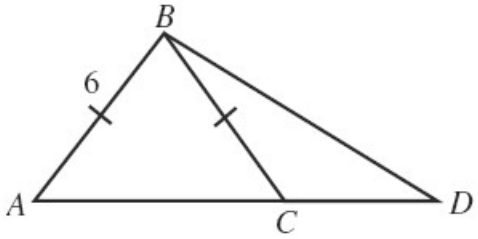
2. *The sides of a certain triangle are in the ratio 5:6:8. Find the size of angles, correct to the nearest degree.*



3. *Find the exact value of x in this triangle.*

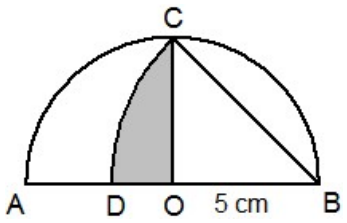


4. *In $\triangle ABC$, AB = BC = 6 cm. AC is produced to D so that CD = 5 cm and BD = 9 cm. Find the exact length of AC.*



3.2 Miscellaneous exercise

Exercise 3.2.1 The diagram shown below is a semicircle of radius $5\,cm$ with centre O. the radius OC is perpendicular to diameter AB. An arc of circle is drawn with centre B and radius BC, intersecting AB at D. Find

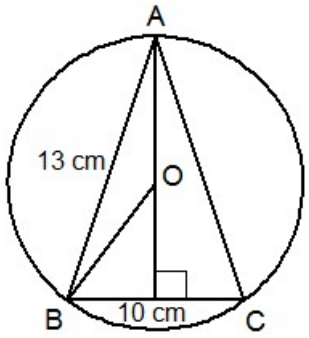


1. *the length of OD, correct to 2 decimal places,*

2. *the size of $\angle OBC$,*

3. *the area of the shaded region, leaving your answer in terms of π.*

Exercise 3.2.2 An isosceles triangle ABC is inscribed in a circle with centre O.
If $AB = AC = 13\,cm$ and $BC = 10\,cm$, find the radius, r cm of the circle.



Exercise 3.2.3 Find the unknown angles and size marked x, y and z in the following diagram.