

Year 10 Term 2 Homework

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

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This edition was printed on October 12, 2009.

Camera ready copy was prepared with the **LaTeX2e** typesetting system.

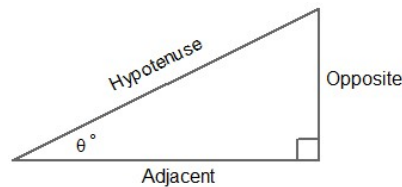
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9 Year 10 Term 2 Week 9 Homework

9.1 Trigonometry with right Triangles

9.1.1 The definition of the trigonometric ration

The definitions of the trigonometric ratio are:



$$\bullet \sin\theta = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{O}{H}$$

$$\bullet \cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{A}{H}$$

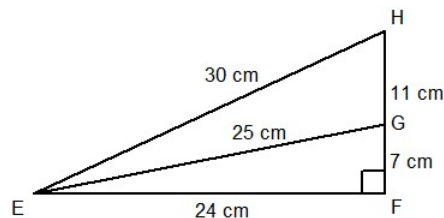
$$\bullet \tan\theta = \frac{\text{opposite}}{\text{adjacent}} = \frac{O}{A}$$

An easy way of remembering these important formulae is:

S O H C A H T O A
Some old houses can always hide their old age

Exercise 9.1.1

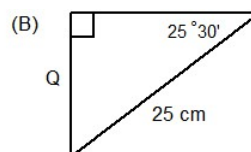
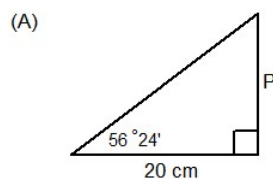
1. Find without simplifying, the value of each ratio below:



(a) $\sin\angle FEG$ _____ ; (b) $\cos\angle FEG$ _____ ; (c) $\tan\angle FGE$ _____ ;

(d) $\sin\angle FHE$ _____ ; (e) $\cos\angle FHE$ _____ ; (c) $\tan\angle FEH$ _____ ;

2. Find the value of each pronumeral, correct to 1 decimal place.



A $P =$ _____

B $Q =$ _____

9.1.2 Finding the length of a side**Exercise 9.1.2**

1. In $\triangle ABC$, $\angle A = 90^\circ$, $\angle C = 62^\circ 45'$ and $BC = 70$ cm. Find the length of AB , correct to 1 decimal place.

2. In $\triangle LMN$, $\angle M = 90^\circ$, $\angle L = 73^\circ 21'$ and $LM = 36.7$ cm. Find the length of LN , correct to 1 decimal place.

9.1.3 Finding the size of an angle**Exercise 9.1.3**

1. In $\triangle FGH$, $\angle H = 90^\circ$, $GH = 19$ cm and $FH = 10$ cm. Find $\angle F$, correct to the nearest minute.

2. In $\triangle IJK$, $\angle I = 90^\circ$, $IK = 12.7$ cm and $JK = 15.9$ cm. Find $\angle K$, correct to the nearest minute.

9.1.4 Evaluating trigonometric expressions**Exercise 9.1.4**

1. Find the value of $\frac{\tan 76^\circ 19'}{\cos 12^\circ 36' - \sin 64^\circ 10'}$, correct to 2 decimal places.

2. If $\tan \theta = 3.6816$, find the acute angle θ , correct to nearest minute.

9.1.5 Angles of elevation and depression

- The angle of elevation is the angle between the horizontal and the line of sight when the observer is looking upward.
- The angle of depression is the angle between the horizontal and the line of sight when the observer is looking downward.

Exercise 9.1.5

1. A water pipe runs along the slope of a 295 m high hill. The pipe is 372 m long. At what angle is the pipe inclined to the horizontal? Answer to the nearest minute.

2. A man standing on top of a cliff of height 165 m looks down to a boat that is anchored 115 m from the base of the cliff. Find the angle of depression of the boat from the top of the cliff, correct to the nearest minute.

9.1.6 The tangent ratio [$\tan = \frac{\sin\theta}{\cos\theta}$]**Exercise 9.1.6**

1. Find the value of $\tan\theta$ in each of the following, where θ is an acute angle. Hence find the size of the angle θ , correct to the nearest minute.

(a) $\sin\theta = \frac{8}{17}$ and $\cos\theta = \frac{15}{17}$ _____

(b) $\sin\theta = 0.7910$ and $\cos\theta = 0.6118$ _____

(c) $\sin\theta = \frac{\sqrt{2}}{3}$ and $\cos\theta = \frac{\sqrt{7}}{3}$ _____

2. In the equations below, θ is an acute angle. Express each equation in terms of $\tan\theta$, then solve for θ , correct to the nearest minute.

(a) $\frac{1}{\cos\theta} = \frac{8}{\sin\theta}$ _____

(b) $\frac{\sqrt{5}}{\cos\theta} = \frac{2}{\sin\theta}$ _____

3. prove that $\frac{\sin\theta\cos\theta}{\tan\theta} = \cos^2\theta$.

9.1.7 The complementary results [$\sin\theta = \cos(90^\circ - \theta)$ and $\cos\theta = \sin(90^\circ - \theta)$]

Exercise 9.1.7

1. Find the value of x in each of these:

(a) $\sin 60^\circ = \cos x^\circ$ _____; (b) $\cos x^\circ = \sin 25^\circ$ _____

2. Solve each of these equations:

(a) $\cos(2x + 56)^\circ = \sin 14^\circ$ _____

(b) $\sin 40^\circ = \cos\left(\frac{x}{2}\right)^\circ$ _____

(c) $\sin(x + 15)^\circ = \cos(x - 6)^\circ$ _____

3. Simplify the following expressions:

(a) $\frac{\cos\theta}{\sin(90^\circ - \theta)}$

(b) $\sin\theta\cos(90^\circ - \theta)$

(c) $\sin(90^\circ - \theta) \times \cos(90^\circ - \theta) \times \tan(90^\circ - \theta)$

9.1.8 The exact values

The exact values for the trigonometric ratios are summarised in the table shown below:

θ	30°	45°	60°	θ	30°	45°	60°	θ	30°	45°	60°
$\sin\theta$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	$\cos\theta$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\tan\theta$	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$

Exercise 9.1.8 Find the exact value of each expression.

1. $\sin 30^\circ + \cos 45^\circ + \tan 60^\circ$ _____

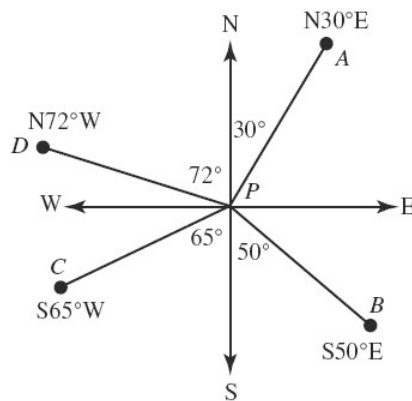
2. $\cos^2 60^\circ - \cos^2 30^\circ$ _____

3. $\cos 45^\circ \cos 30^\circ + \sin 45^\circ \sin 30^\circ$ _____

9.1.9 Compass bearings

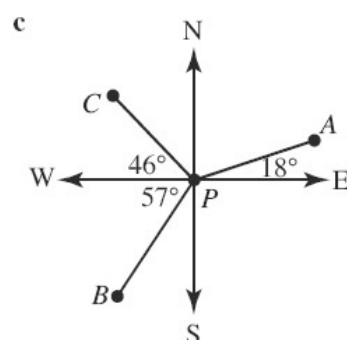
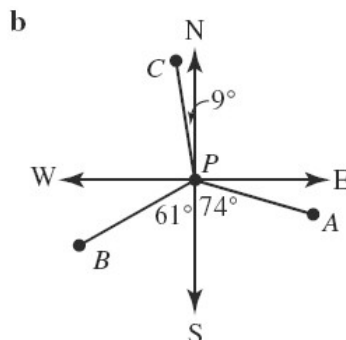
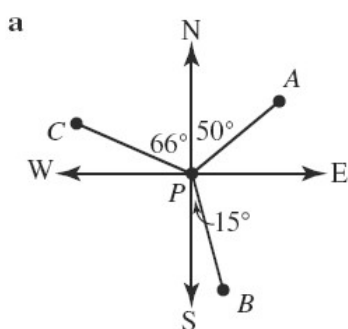
- A compass bearing is a deviation involving the four cardinal directions north, south, east and west.
- Compass bearings are always measured from the north or south and towards the east or west.
- A bearing such as NE means $N45^\circ W$. SE means $S45^\circ E$, etc..

Example 9.1.1



1. The bearing of A from P is $N30^\circ E$
2. The bearing of B from P is $S50^\circ E$
3. The bearing of C from P is $S65^\circ W$
4. The bearing of D from P is $N72^\circ W$

Exercise 9.1.9 Find the compass bearings from P of the points A, B and C.

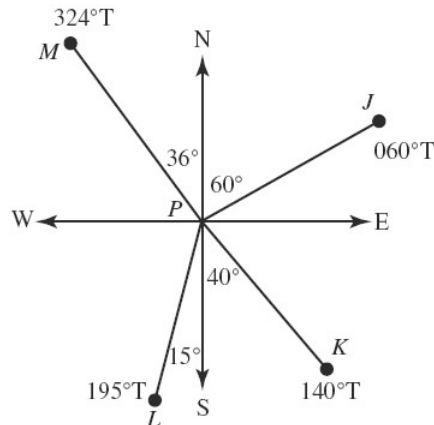


- a Point A _____ , Point B _____ , Point C _____
- a Point A _____ , Point B _____ , Point C _____
- a Point A _____ , Point B _____ , Point C _____

9.1.10 True bearings

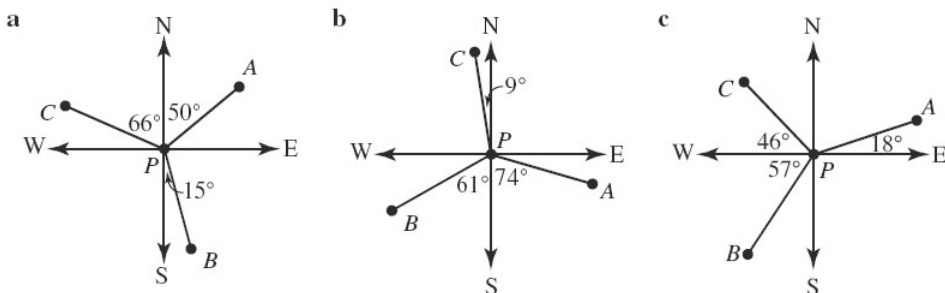
- A true bearing is a deviation from north, measured in a clockwise direction.
- By convention, a true bearing is written using 3 digits.

Example 9.1.2



1. Point J is $060^\circ T$
2. Point K is $140^\circ T$
3. Point L is $195^\circ T$
4. Point M is $324^\circ T$

Exercise 9.1.10 Find the true bearings from P of the points X,Y and Z



a Point A _____ , Point B _____ , Point C _____

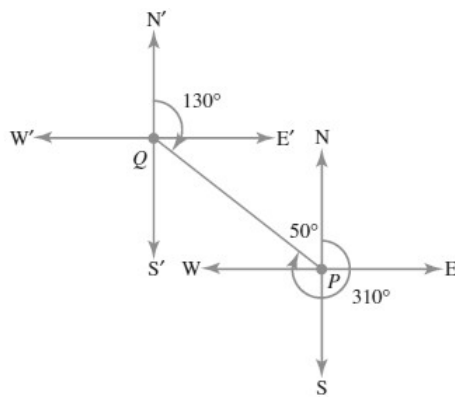
a Point A _____ , Point B _____ , Point C _____

a Point A _____ , Point B _____ , Point C _____

9.1.11 Opposite bearings

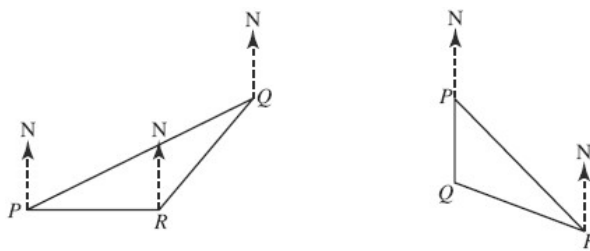
- The opposite bearing of B from A is the bearing of A from B.
- To find the bearing of A from B given the bearing of B from A:
 - draw a compass at B and mark on this compass the angle from north around to the ray BA
 - on the compass with centre A, find the acute angle between BA and the north-south axis
 - use parallel line properties to find the required bearing on the compass with centre B.
- Opposite bearings always differ by 180°

Example 9.1.3 The bearing of Q from P is 310° . Find the bearing of P from Q.



Solution: $\angle NPQ = 360^\circ - 310^\circ = 50^\circ$
 $\angle N'QP = 180^\circ - 50^\circ = 130^\circ$ (co-interior \angle s, and $N'Q \parallel NP$)
 \therefore The bearing of P from Q is 130° .

Exercise 9.1.11 Find the size of $\angle PQR$ for the figures given below:



1. In the left hand figure, the bearing of Q from P is 034° and the bearing of Q from R is 025° .

2. In the right hand figure, the bearing of R from P is 165° and the bearing of Q from R is 315° .

Exercise 9.1.12 Consolidation

1. Emma walked from home (H) to a shopping centre (C) on a bearing of 032° . After the shopping, she walked on a bearing of 122° to a friend's house (F) 850 m due east of her home.

(a) Find the value of $\angle HCF$.

(b) Find the distance between Emma's home and the shopping centre, correct to nearest metre.

2. David drove from home (H) to the beach (B) on a bearing of 254° to pick up his children. He then drove to the cinema (C) on a bearing of 344° , which is 9600 m due west of his home.

(a) Show that $\angle HBC = 90^\circ$.

(b) Find the distance between the beach and the cinema, correct to nearest metre.

3. Two cars A and B left home at the same time. Car A travelled due west at 70 km/h whilst car B travelled due north at 90 km/h. Find after 3 hours:

(a) the distance between two cars, correct to the nearest kilometre.

(b) the bearing of B from A , correct to nearest degree.
