

Year 10 Term 1 Homework

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

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6 Year 10 Term 1 Week 6 Homework

6.1 Triangle trigonometry

6.1.1 The tangent ratio

The tangent ratio can be expressed as the quotient of sine and cosine ratios. $\tan\theta = \frac{\sin\theta}{\cos\theta}$

Exercise 6.1.1 Express each equation in terms of $\tan\theta$, then solve for θ , correct to the nearest minute.

1. $12\cos\theta = 5\sin\theta$

2. $\frac{4}{\sin\theta} = \frac{1}{\cos\theta}$

3. $\frac{\sqrt{3}}{\sin\theta} = \frac{3}{\cos\theta}$

Exercise 6.1.2 Prove each of the following identities:

1. $\frac{\sin\theta\cos\theta}{\tan\theta} = \cos^2\theta$

2. $\frac{\cos\theta\tan\theta}{\sin\theta} = 1$

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

6.1.2 The complementary results

- In any right-angled triangle, the sine of an acute angle is equal to the cosine of its complement,
- and the cosine of an acute angle is equal to the sine of its complement.
- $\sin\theta = \cos(90^\circ - \theta)$ and $\cos\theta = \sin(90^\circ - \theta)$

Exercise 6.1.3 Solve each of these equations:

1. $\cos(2x + 58)^\circ = \sin 12^\circ$

2. $\sin(x + 18)^\circ = \cos(x - 18)^\circ$

Exercise 6.1.4 Simplify the following expressions:

1. $\frac{\cos(90^\circ - \theta)}{\tan\theta}$

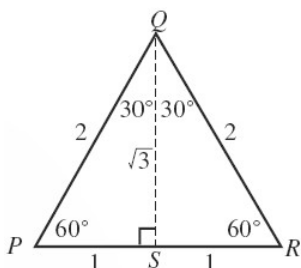
2. $\sin(90^\circ - \theta)\cos(90^\circ - \theta)\tan(90^\circ - \theta)$

Exercise 6.1.5 Prove each of the following identities:

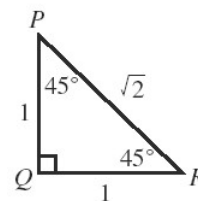
1. $\frac{\sin\theta\cos(90^\circ - \theta)}{\tan^2\theta} = \cos^2\theta$

2. $\frac{\sin\theta\sin(90^\circ - \theta)}{\cos\theta\cos(90^\circ - \theta)} = 1$

6.1.3 The exact values



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 6.1.6 Find the exact value of each expression:

1. $\tan^2 60^\circ - 2\cos^2 45^\circ$

2. $2(\sin^2 45^\circ + \cos^2 45^\circ)$

3. $\sin^2 60^\circ - \cos^2 60^\circ$

Exercise 6.1.7 Show that:

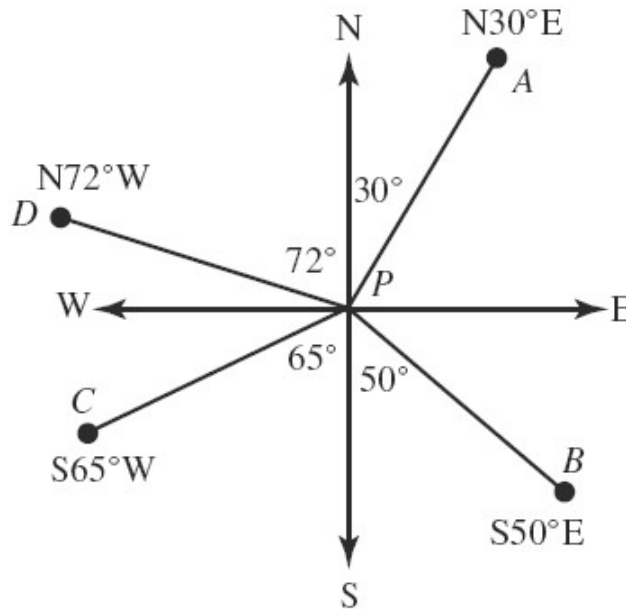
1. $\sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ = 1$

2. $\sin 45^\circ \cos 60^\circ + \cos 45^\circ \sin 60^\circ = \frac{\sqrt{6} + \sqrt{2}}{4}$

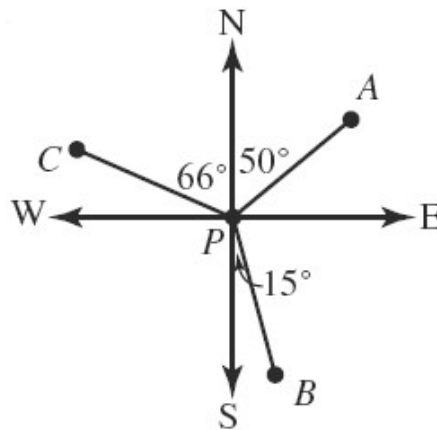
6.2 Bearings

6.2.1 Compass bearings

A Compass bearing is a deviation from north or south and towards east or west. For example a bearing such as NE means $N45^\circ E$. Similarly NW means $N45^\circ W$. While a bearing of $N30^\circ E$ means a deviation of 30° from north towards the east as shown below.

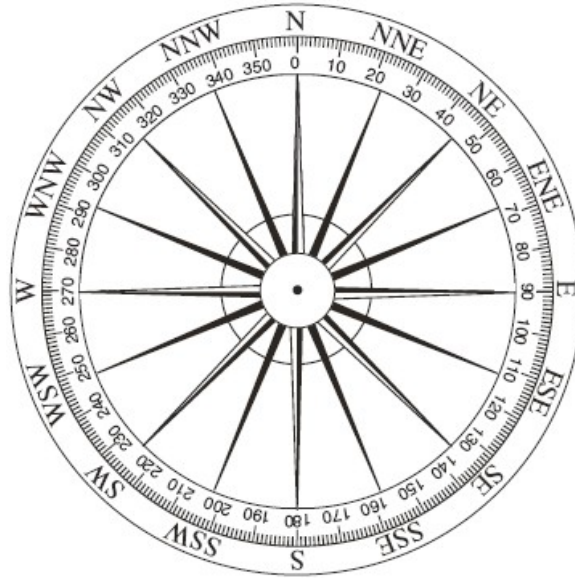


Exercise 6.2.1 Find the compass bearings from P of the points A, B, C.



6.2.2 The 16 point compass

The 16 point compass, or mariner’s compass, was used by mariners to determine directions while at the sea. The direction on the 16 point compass are given as deviation from the four cardinal directions and towards the four intermediate directions (i.e. NE NW, SE, SW)



Exercise 6.2.2

1. How many degrees is the angle between:

(a) NNE and ENE? _____

(b) NW and SW? _____

(c) SSW and SE? _____

(d) SSW and NNE? _____

2. You are facing North-West and turn anti-clockwise through 90°. In which direction are you now facing?

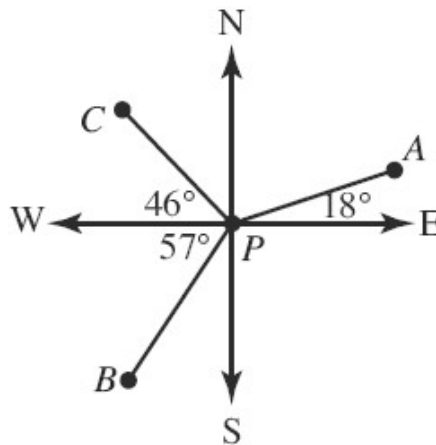
3. You makes 4 equal turns from NE to SE. What angle is each turn?

6.2.3 True bearings

True bearing is a deviation from north, measured in a clockwise direction. True bearings are written using three digits.

Exercise 6.2.3

1. Find the true bearing from P of the points A, B and C.



2. Adam drove 82 km on a bearing of 062° . How far east was he then from his starting point?

3. David flew a light plane 118 km on a bearing of 308° . How far north was he then from his starting point?

4. After turning anti-clockwise through 225° , you are facing East. In which direction were you facing at the start?

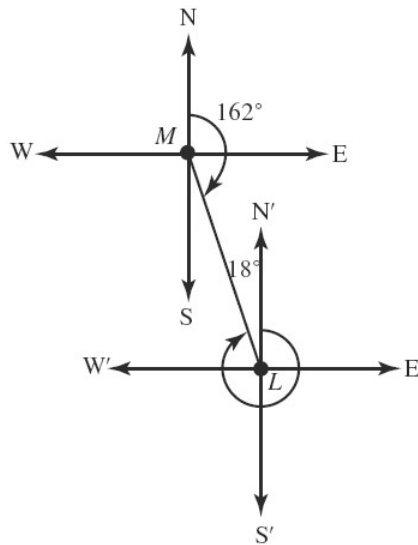
6.2.4 Opposite bearings

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 bearing always differ by 180°

Exercise 6.2.4

1. The bearing of L from M is 162° . Find the bearing of M from L.



2. Keith sailed 19 km due east from R to S, then sailed 22 km due north to T. Find the bearing of:

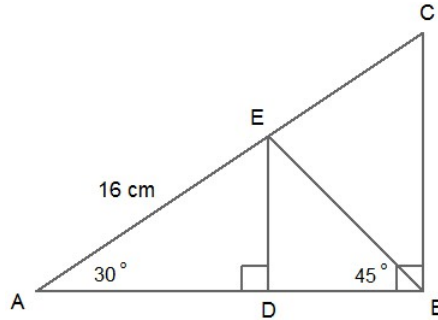
(a) T from R

(b) R from T

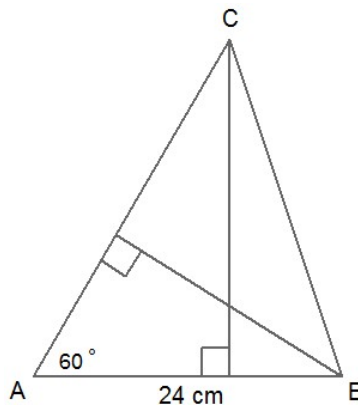
6.3 Miscellaneous exercises

Exercise 6.3.1

- Find the exact value of CE given that $AE = 16$ cm.

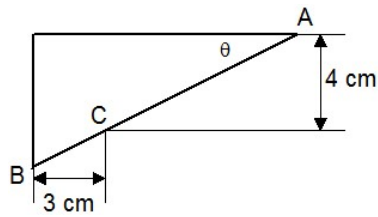


- In $\triangle ABC$, $AB = 24$ cm. $\angle CAB = 60^\circ$ and $\angle CBA = 75^\circ$. Find as exact values of AC and BC . Hence, find the area of $\triangle ABC$.



Exercise 6.3.2

1. Find the distance AB shown in the figure (in exact value), given that $\theta = 30^\circ$.



2. Simplify $\frac{\frac{1}{x^2}}{1 - \frac{1}{x}}$.

3. Simplify $\frac{5}{x-3} - \frac{x}{x^2-9}$.

4. Evaluate $(-8)^{\frac{2}{3}}$.
