

Year 10 Starter

Right-angled Trig, Bearings, and Directions

Matthew Holmes

Contents

Questions and short answers

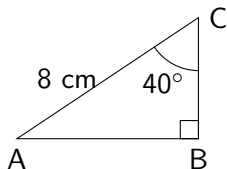
▶ Starter 1

Worked solutions

▶ Starter 1

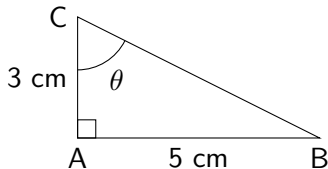
Starter 1

1.



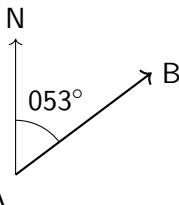
Find the length of BC .

2.

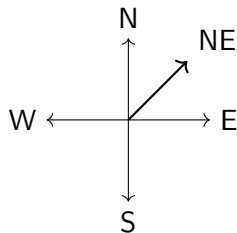


Find θ

3.



4.



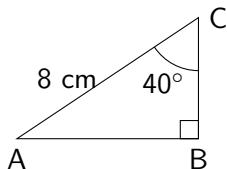
The bearing of **B**
from A is 053° .

What is the
bearing of **A from**
B?

Which directions
are at right angles
to **Northeast**?

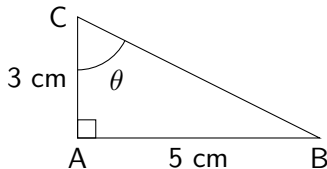
Starter 1

1.



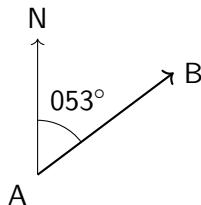
Find the length of BC. $8 \cos 40^\circ \approx 6.13$ cm

2.

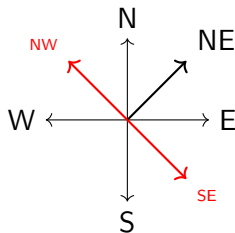


Find $\theta \approx 59.0^\circ$

3.



4.



The bearing of **B from A** is 053° .

What is the bearing of **A from B** 233°

Which directions are at right angles to **Northeast**?

Worked Solution: Starter 1, Question 1

Question: In right-angled triangle ABC , the right angle is at B , $AC = 8$ cm, and $\angle ACB = 40^\circ$. Find the length of BC .

Worked Solution:

Relative to the 40° angle at C :

- ▶ The **hypotenuse** is $AC = 8$ cm.
- ▶ The side BC is **adjacent** to the angle.
- ▶ The side AB is **opposite** the angle.

Since we know the hypotenuse and want the adjacent side, we use the cosine ratio:

$$\cos 40^\circ = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{BC}{AC} = \frac{BC}{8}$$

Rearranging gives:

$$BC = 8 \cos 40^\circ$$

Using a calculator:

$$BC \approx 8 \times 0.7660 \approx 6.13 \text{ cm}$$

Worked Solution: Starter 1, Question 2

Question: In right-angled triangle ABC , the right angle is at A , $AB = 5$ cm, and $AC = 3$ cm. Find the angle θ at C .

Worked Solution:

Relative to angle θ at C :

- ▶ The side $AB = 5$ cm is **opposite** the angle.
- ▶ The side $AC = 3$ cm is **adjacent** to the angle.

Since we know the opposite and adjacent sides, we use the tangent ratio:

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}} = \frac{AB}{AC} = \frac{5}{3}$$

So:

$$\theta = \tan^{-1} \left(\frac{5}{3} \right)$$

Using a calculator:

$$\theta \approx \tan^{-1}(1.6667) \approx 59.0^\circ$$

Worked Solution: Starter 1, Question 3

Question: The bearing of B from A is 053° . What is the bearing of A from B ?

Worked Solution:

Bearings are measured clockwise from North. The bearing of A from B is the **back bearing**; reverse directions differ by 180° .

Since $053^\circ < 180^\circ$, we add 180° :

$$053^\circ + 180^\circ = 233^\circ$$

The bearing of A from B is 233°
--

Worked Solution: Starter 1, Question 4

Question: Which directions are at right angles to **Northeast**?

Worked Solution:

Northeast is halfway between North and East, so its bearing is:

$$045^{\circ}$$

Directions at right angles are 90° away:

$$045^{\circ} + 90^{\circ} = 135^{\circ}$$

A bearing of 135° is **Southeast**.

$$045^{\circ} - 90^{\circ} = -45^{\circ}$$

Since bearings are conventionally measured between 0° and 360° :

$$-45^{\circ} + 360^{\circ} = 315^{\circ}$$

A bearing of 315° is **Northwest**.