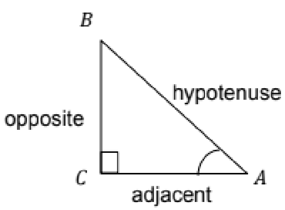
Name:	Date:

Main Ideas/Questions	Notes/Examples
What are **TRIGONOMETRIC RATIOS**	Trigonometric ratios help us find missing angles, missing side lengths, heights of buildings, and distances that we cannot measure directly. ⇨ Trigonometric ratios are only used in **RIGHT-ANGLED** TRIANGLE.

Step 1: Start by labelling the hypotenuse, adjacent, and opposite based on given angle.

☐ The longest side is the **hypotenuse** (always opposite the 90°).
☐ The side next to the angle you are looking at is the **adjacent**.
☐ The side opposite the angle is the **opposite**.

Each acute angle (0° < angle < 90°) of a right triangle has the following trigonometric ratios:



SINE	$\text{Sin } \theta = \frac{Opposite}{Hypotenuse}$
COSINE	$\text{Cos } \theta = \frac{Adjacent}{Hypotenuse}$
TANGENT	$\text{Tan } \theta = \frac{Opposite}{Adjacent}$

*** REMEMBER!! ***

tan = ______ cos = ______ sin = ______

Obtuse Angles

❖ **Trigonometric ratios can be applied to obtuse angles by using reference angles.**

Key Relationships:

❖ sin(θ) = sin (180° - θ) (Always positive for obtuse angles).
❖ cos(θ) = -cos (180° - θ) (Always negative for obtuse angles)
❖ tan(θ) = -tan (180° - θ) (Always negative for obtuse angles)

Where θ is an obtuse angle.

TIPS:

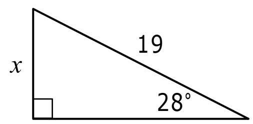
1. Find the reference angle (acute angle): $\alpha = 180^{\circ} - \theta$
2. Then, apply the trigonometric ratio for α.
3. Finally, apply the sign rules for the obtuse angle.

FINDING SIDE LENGTHS Using Trigonometry

Note: Make sure your calculator is in **degree mode**!

Solve for x.

1.



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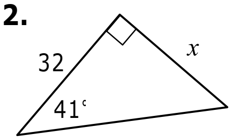

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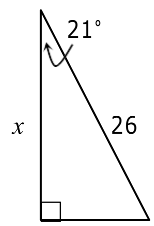

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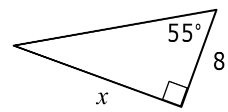

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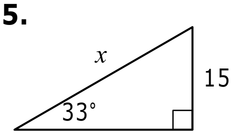

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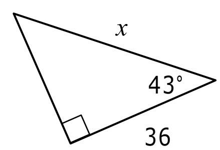

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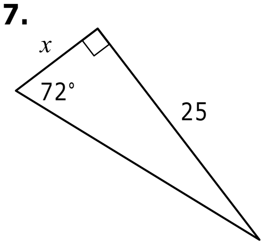


8. Kelly leaned a 12-m ladder against his house. If the angle formed by the ladder and the ground is 68°, how far from the base of the house did he place the ladder?

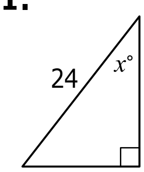
Main Ideas/Questions	⇨ Leave all angles correct to 1 decimal place, unless otherwise stated in the question.

FINDING ANGLE

Note: Make sure your calculator is in **degree mode**!

Find the value of x.

1.



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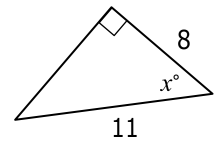

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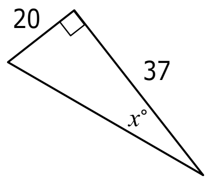

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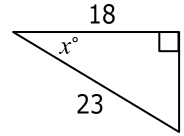

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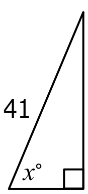
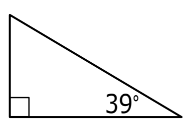


REVIEW:

Sides & Angles

Find the value of x.

7.



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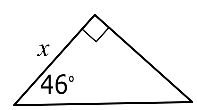

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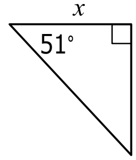

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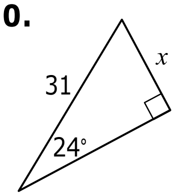
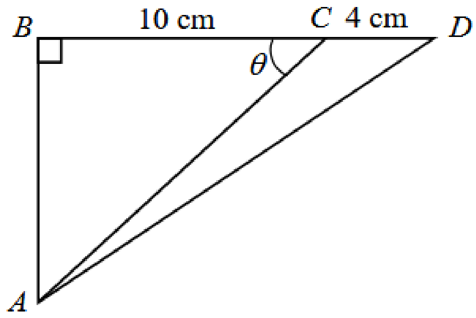


11. 2018 Methodist Girls' School S4 PRELIM P1 Q6 [6 Marks]

In the diagram, not drawn to scale, BCD is a straight line. Given that $BC = 10$ cm, $CD = 4$ cm, and $\cos\theta = \frac{4}{5}$.



Find

(a) the length of AC,

(b) the value of $\tan\angle ACD$, giving your answer as a fraction in its simplest form,

(c) the exact value of AD^2,

(d) the shortest distance of C to AD.

Answer : **(a)** .... cm [1]

(b) .... [2]

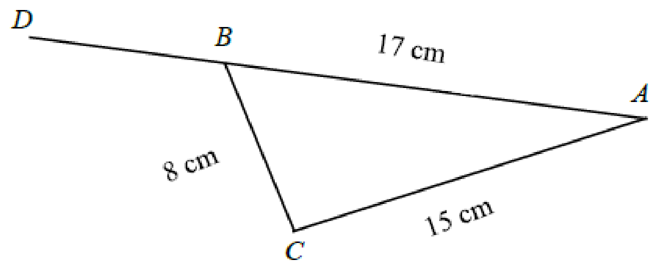
(c) .... [1]

(d) .... cm [2]

Ans: (a)12.5cm/ (b) -3/4 (c) 252.25 (d) 1.89cm

12. 2022 BOONLAY SEC 3 EOY P1 Q10 [4 MARKS]

In the diagram, $AB = 17$ cm, $AC = 15$ cm, $BC = 8$ cm and ABD is a straight line.



(a) Show that ΔABC is a right-angled triangle.

Answer ……………………………………………………………………………

……………………………………………………………………………

……………………………………………………………………………

……………………………………………………………………………

…………………………………………………………………………… [2]

(b) Write down as a fraction the exact value of

(i) $\tan \angle CAB$,

Answer ………………………… [1]

(ii) $\cos \angle CBD$.

Answer ………………………… [1]

Ans: (a)show that $BC^2 + AC^2 = 289$ & $AB^2 = 289$ / *(b)8/15 (c)* $-\frac{8}{17}$

13. 2014 O LEVEL EMATH P1 Q4 [2 MARKS]

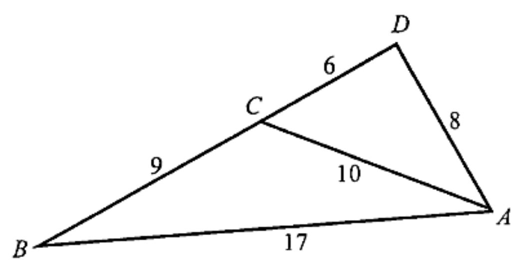
The sine of an angle is 0.7420.

Give two possible values for the angle. [2]

Ans: 47.9 deg or 132.1 deg (or 0.836 rad or 2.31 rad)

14. 2023 ACS (BARKER RD) S3 EOY EMATH P1 Q14 [4 MARKS]

ABC is a triangle in which $AC = 10$ cm, $BC = 9$ cm and $AB = 17$ cm. *D* is a point on *BC* produced, where $CD = 6$ cm and $AD = 8$ cm.



(a) Explain why angle *ADB* is a right angle.

Answer ______________________________

____

____

______________________________ [2]

(b) Find $\cos\angle ACB$, expressing your answer as a fraction.

Answer ______________________ [2]

Ans: (b)

$\cos\angle ACB = -\cos\angle ACD = -\frac{3}{5}$