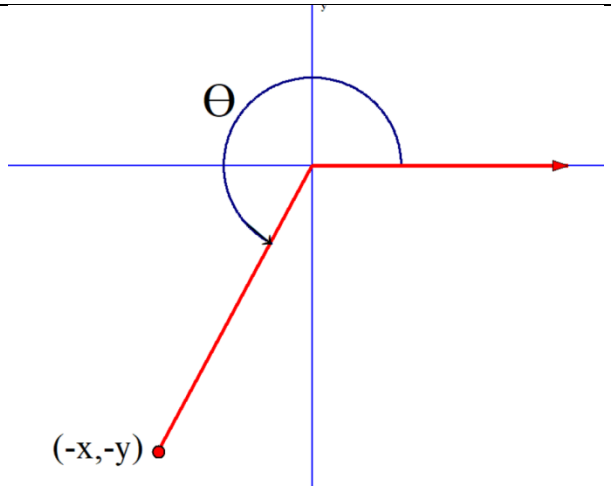
Math 20-1 Trigonometry Review

Use the graph below to answer the first question.



The graph above shows an angle θ drawn in standard position, where $\cos\theta = \frac{-8}{17}$. The following statements are made.

Statement 1	The point on the end of the terminal arm is (-8,-9)
Statement 2	The reference angle is 62^0.
Statement 3	$\tan\theta = \frac{-15}{8}$
Statement 4	$\sin\theta = \frac{-15}{17}$

1. The two true statements are

   A) 1 and 2 B) 3 and 4 C) 1 and 3 D) 2 and 4

2. The measure of the other 3 angles in standard position, $0^0 < \theta < 360^0$, that have a reference angle of 8^0, are _____, _____, and _____.

3. If $\cos\theta < 0$, the value of θ in the equation $16\sin\theta - 1 = 7$, is _____.

4. As an exact value, $\cos^2 30^0 + \tan 210^0$ is

   A) $\frac{9+4\sqrt{3}}{12}$ B) $\frac{3+\sqrt{3}}{7}$ C) $\frac{3+\sqrt{3}}{12}$ D) $\frac{9+4\sqrt{3}}{7}$

5. To the nearest degree, the values of θ that satisfy the equation $\sin\theta = -0.7615$, where $0^0 < \theta < 360^0$, are _____ and ____.

6. The point P(6,11) is on the terminal arm of an angle in standard position. The tan and sin of P are:

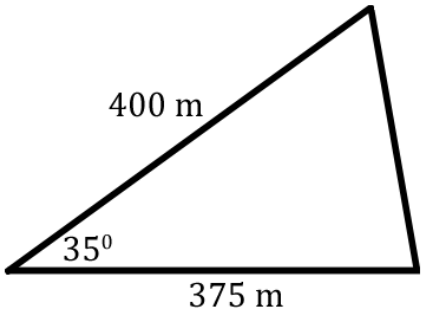
   A) $\tan P = \frac{6}{11}$ **and** $\sin P = \frac{6\sqrt{157}}{157}$

   B) $\tan P = \frac{6}{11}$ **and** $\sin P = \frac{11\sqrt{157}}{157}$

   C) $\tan P = \frac{11}{6}$ **and** $\sin P = \frac{6\sqrt{157}}{157}$

   D) $\tan P = \frac{11}{6}$ **and** $\sin P = \frac{11\sqrt{157}}{157}$

Use the diagram below to answer the next question.



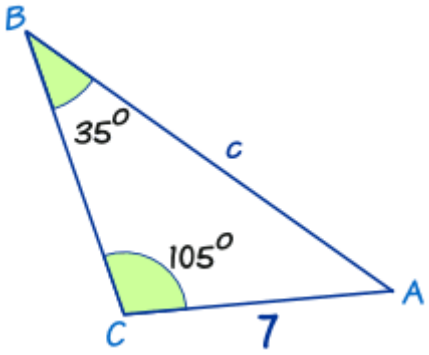
7. To the nearest metre, the perimeter of the triangle is _____.

8. The point (4, -8) lies on the terminal arm of an angle, θ, in standard position. Which two of the following points lies on the terminal arm of an angle with a reference angle that is the ***same*** as that of θ?

Point 1	(-4,-8)
Point 2	$(\frac{1}{2}, -1)$
Point 3	$(1, -\frac{1}{2})$
Point 4	(-2, 6)

A) 1 and 2 B) 3 and 4 C) 1 and 3 D) 2 and 4

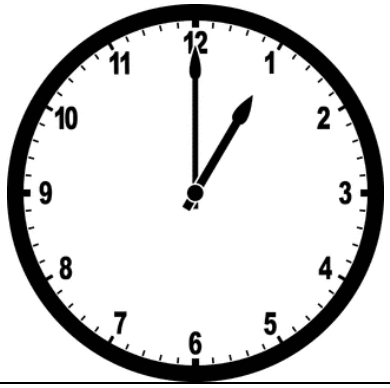
Use the diagram below to answer the next question.



9. The value of C can be found using

A) $\frac{7(sin35)}{sin105}$ B) $\frac{7(sin105)}{sin35}$ C) $\frac{(sin105)}{7(sin35)}$ D) $\frac{(sin35)}{7(sin105)}$

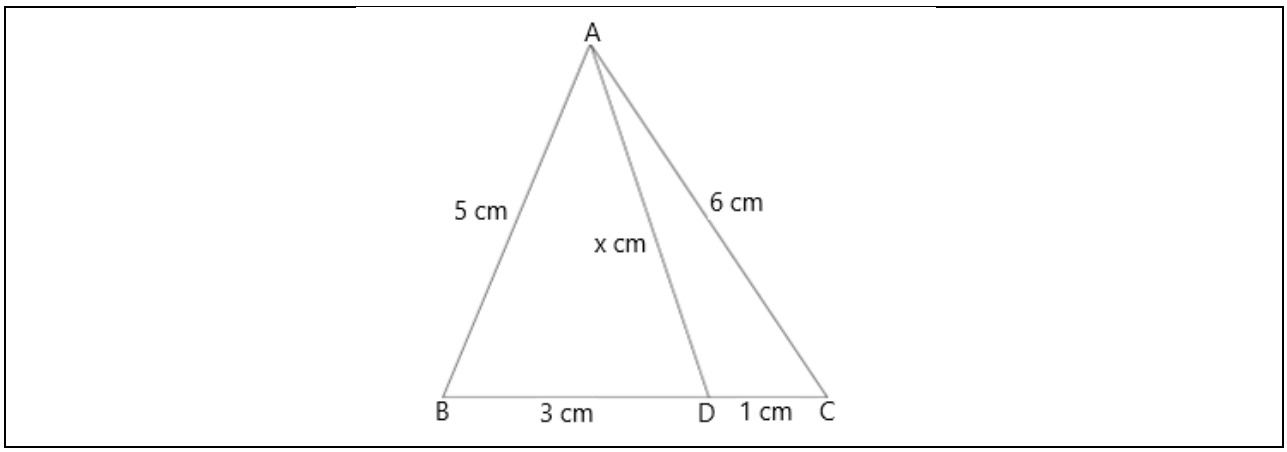
The minute hand is 15 cm and the hour hand is 10 cm.



10. How far apart, to the nearest tenth, are the tips of these hands at 1:00?

11.In triangle ABC, c = 28 cm, b = 19 cm and angle B = 34^0. Determine to the nearest tenth of a degree, **two** possible measure of angle C.

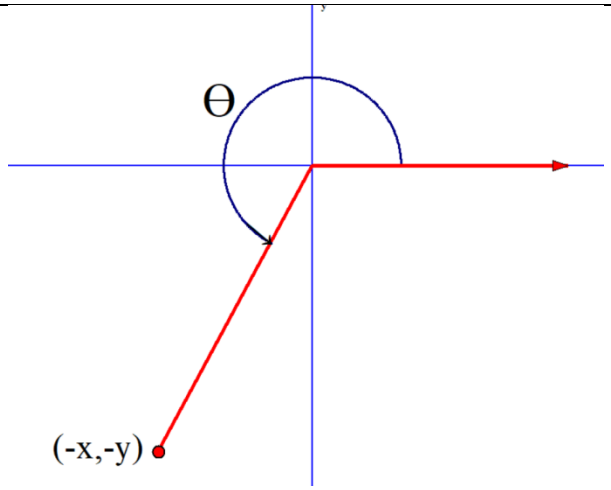
Use the following diagram to answer the next question.



12. Given that angle ADC is 65^0, determine x, to the nearest tenth of a cm, by first finding angle C. [Use both the sine and the cosine law in determining the value of x]

Math 20-1 Trigonometry Review Solutions

Use the graph below to answer the first question.



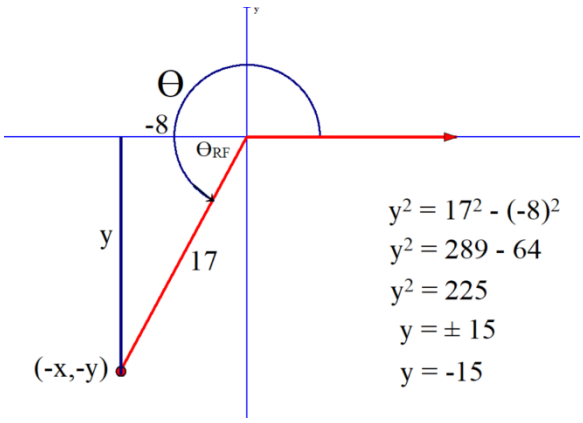
The graph above shows an angle θ drawn in standard position, where cos θ = $\frac{-8}{17}$. The following statements are made.

Statement 1	The point on the end of the terminal arm is (-8,-9)
Statement 2	The reference angle is 62^0.
Statement 3	Tanθ = $\frac{-15}{8}$
Statement 4	Sinθ = $\frac{-15}{17}$

1. The two true statements are

A) 1 and 2 B) 3 and 4 C) 1 and 3 D) 2 and 4

Solution



$y^2 = 17^2 - (-8)^2$
$y^2 = 289 - 64$
$y^2 = 225$
$y = \pm 15$
$y = -15$

Statement 1: The point on the end of the terminal arm is (-8, -15). This statement is **false.**

Statement 2: $\cos^{-1}\theta = (8/17) = 62^0$. This statement is **true.**

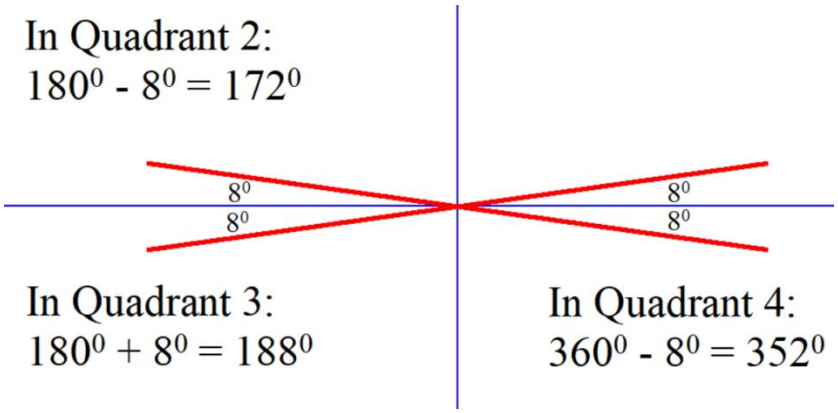
Statement 3: This statement is **false.** Tangent is positive in quadrant 3.

Statement 4: This statement is **true.**

The correct answer is D.

2. The measure of the other 3 angles in standard position, $0^0 < \theta < 360^0$, that have a reference angle of 8^0, are _172^0_, _188^0_, and _352^0_.

Solution



3. If $\cos\theta < 0$, the value of θ in the equation $16\sin\theta - 1 = 7$, is _150^0_.

Solution

Isolate $\sin\theta$.

$16\sin\theta - 1 + 1 = 7 + 1$

$16\sin\theta = 8$

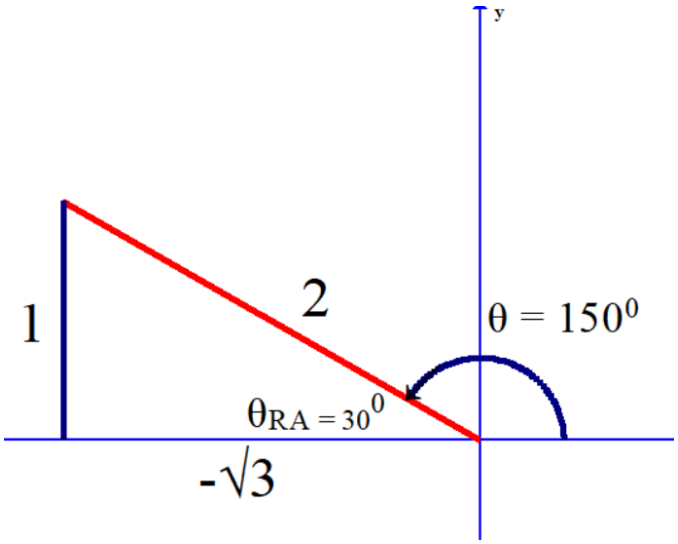
$\sin\theta = \frac{1}{2}$

Use the calculator to find the reference angle.

$\sin^{-1}(\theta) = \frac{1}{2}$

$\theta = 30^0$

Since sin is positive and cos is negative, we are looking for θ in quadrant 2.



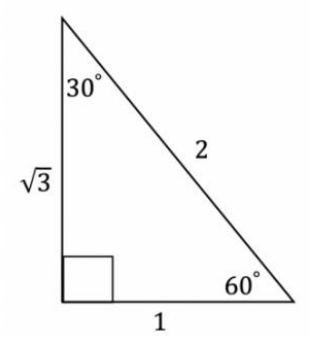
The solution is 150^0.

4. As an exact value, $\cos^2 30^0 + \tan 210^0$ is

A) $\frac{9+4\sqrt{3}}{12}$ B) $\frac{3+\sqrt{3}}{7}$ C) $\frac{3+\sqrt{3}}{12}$ D) $\frac{9+4\sqrt{3}}{7}$

Solution

Recall special triangle ratios.



The cosine of 30^0 is $\frac{\sqrt{3}}{2}$. When this ratio is squared, the result is $\frac{3}{4}$.

The reference angle for 210^0 is also 30^0. Since 210^0 is in quadrant 3, we know that tangent is positive. The tangent of 210^0 is $\frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$, when the denominator is rationalized.

Now add $\frac{3}{4}$ to $\frac{\sqrt{3}}{3}$. Express each term with a common denominator of 12.

$\frac{9}{12} + \frac{4\sqrt{3}}{12}$

$= \frac{9+4\sqrt{3}}{12}$ **The correct answer is A.**

5. To the nearest degree, the values of θ that satisfy the equation $\sin\theta = -0.7615$, where $0^0 < \theta < 360^0$, are _230^0__ and _310^0_.

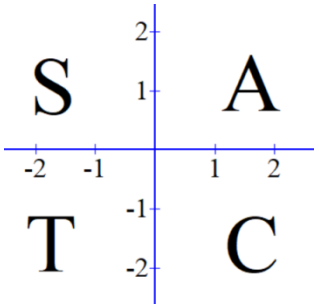
Solution

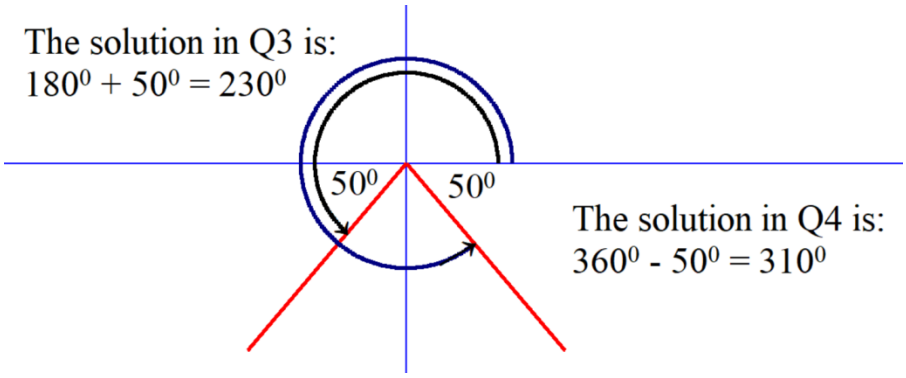
Use the positive ratio value to determine the reference angle with the calculator.

$\sin^{-1}(\theta) = 0.7615$

$\theta = 49.6^0$ or 50^0

Using the CAST rule, we know that sine is negative in quadrants 3 and 4.





6. The point P(6,11) is on the terminal arm of an angle in standard position. The tan and sin of P are:

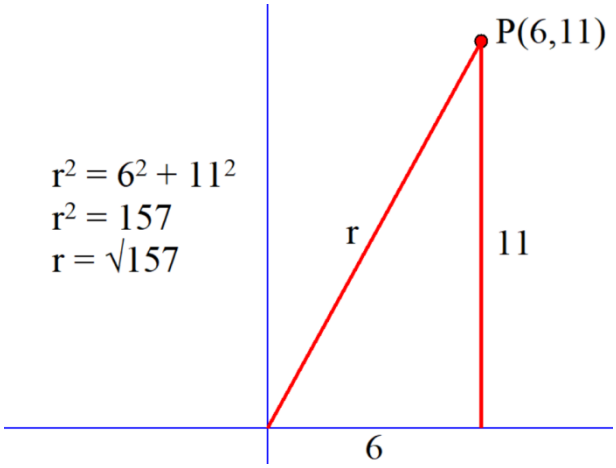
A) $\tan P = \frac{6}{11}$ **and** $\sin P = \frac{6\sqrt{157}}{157}$

B) $\tan P = \frac{6}{11}$ **and** $\sin P = \frac{11\sqrt{157}}{157}$

C) $\tan P = \frac{11}{6}$ **and** $\sin P = \frac{6\sqrt{157}}{157}$

D) $\tan P = \frac{11}{6}$ **and** $\sin P = \frac{11\sqrt{157}}{157}$

Solution



tan P = $\frac{11}{6}$

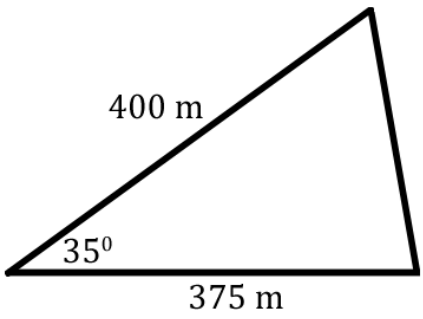
sin P = $\frac{11}{\sqrt{157}}$

Rationalize the denominator.

$$\frac{11}{\sqrt{157}} X \frac{\sqrt{157}}{\sqrt{157}} = \frac{11\sqrt{157}}{157}$$

The correct answer is D.

Use the diagram below to answer the next question.



7. To the nearest metre, the perimeter of the triangle is _1009 m_.

Solution

Since we have two sides and the contained angle, we will use the cosine law to determine the missing side. The missing side will be called x.

$x^2 = 400^2 + 375^2 - 2(400)(375) \cos 35^0$

$x^2 = 160\,000 + 140\,625 - 245\,745.6133$

$x^2 = 54\,879.38671$

$x = 234.26$ m

The perimeter of the triangle is 400 + 375 + 234.26 = 1009.26

To the nearest metre, the perimeter of the triangle is _1009 m_.

8. The point (4, -8) lies on the terminal arm of an angle, θ, in standard position. Which two of the following points lies on the terminal arm of an angle with a reference angle that is the ***same*** as that of θ?

Point 1	(-4,-8)
Point 2	$(\frac{1}{2}, -1)$
Point 3	$(1, -\frac{1}{2})$
Point 4	(-2, 6)

A) 1 and 2 B) 3 and 4 C) 1 and 3 D) 2 and 4

Solution

Each of the given points, represents the tangent ratio. The y-coordinate represents the side opposite the reference angle, and the x-coordinate represents the side adjacent the reference angle.

As long as the absolute value of the ratio is the same, the reference angle will be the same.

For the given point (4, -8), $\left|\frac{-8}{4}\right| = 2$

For point 1 (-4,-8), $\left|\frac{-8}{-4}\right| = 2$

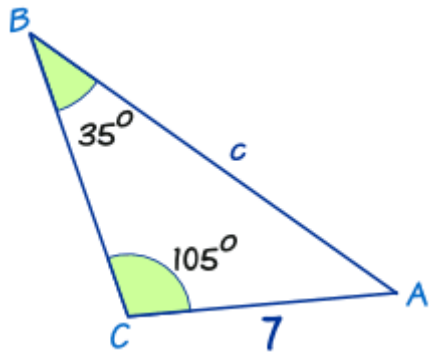
For point 2 ($\frac{1}{2}$, -1), $\left|\frac{-1}{\frac{1}{2}}\right| = 2$

For point 3, $(1, -\frac{1}{2})$, $\left|\frac{-\frac{1}{2}}{1}\right| = \frac{1}{2}$

For point 4, (-2, 6), $\left|\frac{6}{-2}\right| = 3$

The correct answer is A.

Use the diagram below to answer the next question.



9. The value of C can be found using

A) $\frac{7(sin35)}{sin105}$ B) $\frac{7(sin105)}{sin35}$ C) $\frac{(sin105)}{7(sin35)}$ D) $\frac{(sin35)}{7(sin105)}$

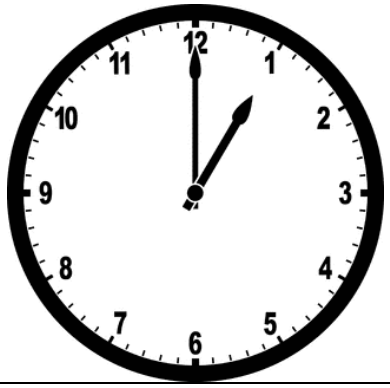
Solution

$$\frac{c}{sin105} = \frac{7}{sin35}$$

$$c = \frac{7(sin105)}{sin35}$$

The correct answer is B.

The minute hand is 15 cm and the hour hand is 10 cm.



10. How far apart, to the nearest tenth, are the tips of these hands at 1:00?

Solution

There are 360^0 in a circle. With a clock divided into 12 equal sectors, each hour represents $\frac{1}{12}$ of 360^0. Therefore the angle between the two hands of the clock is 30^0.

Given that we have two sides and the contained angle, the missing side (which represents how far apart the tips of the hands are at 1:00) can be determined by using the cosine law.

$x^2 = 15^2 + 10^2 - 2(15)(10) \cos 30^0$

$x^2 = 225 + 100 - 259.807\ldots$

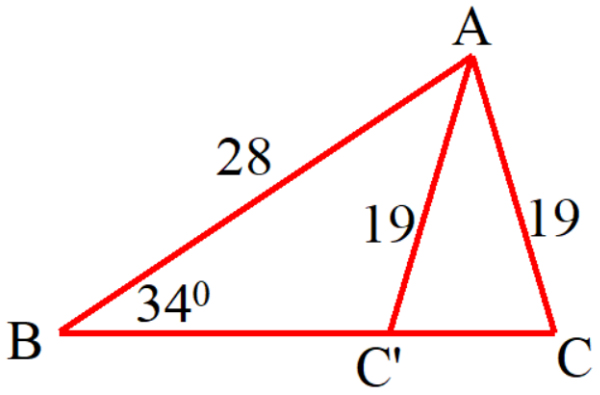
$x^2 = 65.192\ldots$

$x = 8.074\ldots$

At 1:00, the tips of these hands are 8.1 cm apart.

11.In triangle ABC, c = 28 cm, b = 19 cm and angle B = 34^0. Determine to the nearest tenth of a degree, **two** possible measure of angle C.

Solution



We know that the two possible values for angle C will be supplementary. Use the sine law to find the first angle.

$$\frac{sinC}{28}=\frac{sin34}{19}$$

$$sinC=\frac{(28)(sin34)}{19}$$

sinC = 0.824...

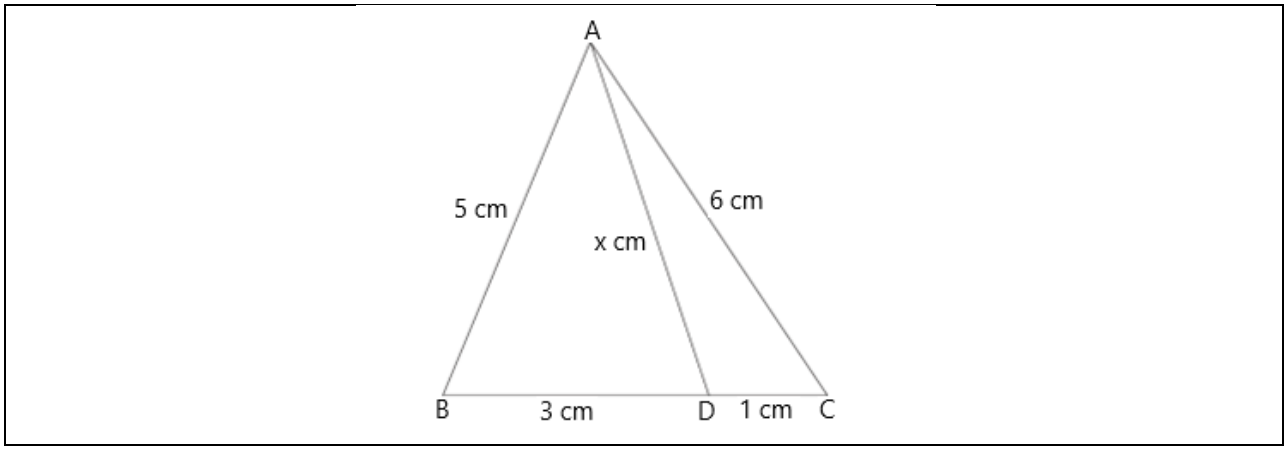
$C = 55.5^0$

We have determined the acute angle C. To find angle C', subtract this value from 180^0.

$180^0 - 55.5^0 = 124.5^0$.

The two possible angle measures for C are 55.5^0 and 124.5^0.

Use the following diagram to answer the next question.



12. Given that angle ADC is 65^0, determine x, to the nearest tenth of a cm, by first finding angle C. [Use both the sine and the cosine law in determining the value of x]

Solution

Angle C can be found using the cosine law, since we have the measures of all sides.

$\cos C = \frac{4^2 + 6^2 - 5^2}{2(4)(6)}$

$\cos C = 0.5625$

$C = 55.77\ldots$ or 56^0.

Using the sine law:

$$\frac{x}{sin56} = \frac{6}{sin65}$$

$$x = \frac{(sin56)(6)}{sin65}$$

x = 5.5 cm