Advanced Trigonometry - Lesson 2
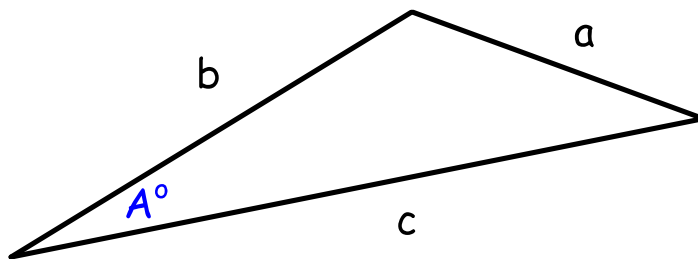
Cosine Rule (Angle)

<u>LI</u>

- Use the Cosine Rule to find a missing angle in any triangle.

<u>SC</u>

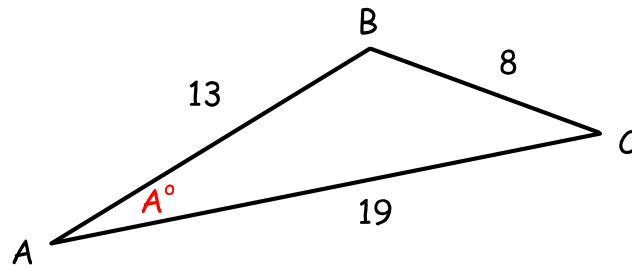- Use a calculator properly.

Jan 10-12:11

Rearrange $a^2 = b^2 + c^2 - 2bc \cos A^\circ$

for $\cos A^\circ$ to get :

$$\cos A^\circ = \frac{b^2 + c^2 - a^2}{2\,b\,c}$$

<u>Example 1</u>

Calculate $A°$ to 1 d.p. .

$A°$ =	,	a = 8
$B°$ =	,	b = 19
$C°$ =	,	c = 13

$$\cos A° = \frac{b^2 + c^2 - a^2}{2\,b\,c}$$

$$\cos A° = \frac{19^2 + 13^2 - 8^2}{(2 \times 19 \times 13)}$$

$$\cos A° = \frac{466}{494}$$

$$A° = \cos^{-1}(466 \div 494)$$

$$A° = 19.4°$$

Example 2

Calculate $P°$ to 1 d.p. .

Q

24

17

R

$P°$

37

P

$P° =$	,	$p = 17$
$R° =$	,	$r = 24$
$Q° =$	,	$q = 37$

$$\cos P° = \frac{r^2 + q^2 - p^2}{2\,r\,q}$$

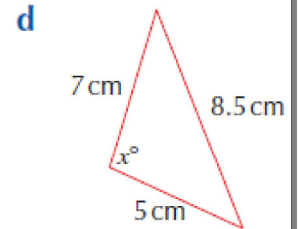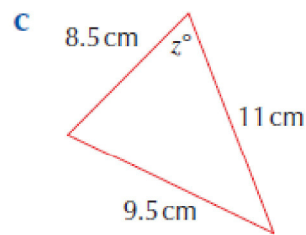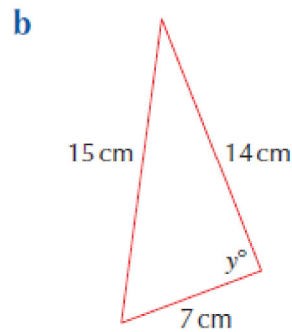$$\cos P° = \frac{24^2 + 37^2 - 17^2}{(2 \times 24 \times 37)}$$

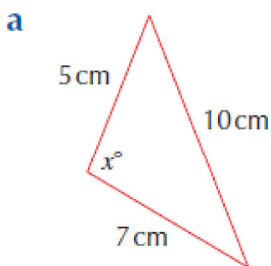$$\cos P° = \frac{1\,656}{1\,776}$$

$$P° = \cos^{-1}(1\,656 \div 1\,776)$$
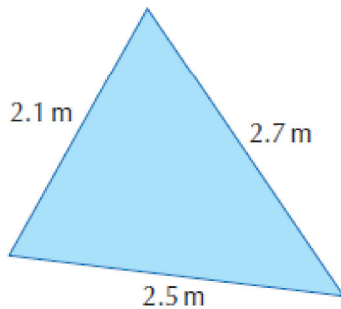
$$P° = 21.2°$$

Questions

1 Calculate the size of the missing angle in each triangle. Give your answers to 1 decimal place.

a

5 cm
10 cm
$x°$
7 cm

b

15 cm
14 cm
$y°$
7 cm

c

8.5 cm
$z°$
11 cm
9.5 cm

d

7 cm
8.5 cm
$x°$
5 cm

2 A swimming pool is designed in the shape of a triangle as shown. Calculate the size of the largest angle. Give your answer to 1 decimal place.
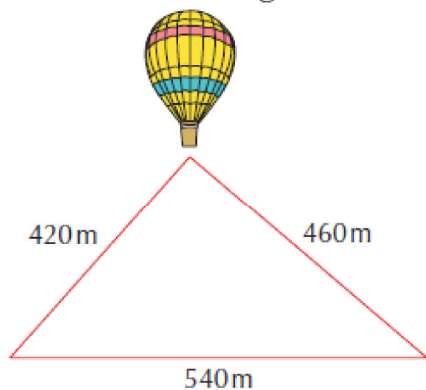
2.1 m
2.7 m
2.5 m

3 The perimeter of the triangle shown is 28 m. Calculate the size of angle $x°$ to 1 decimal place.

10 m
$x°$
13 m

4 A flag is designed in the shape of a triangle. The edges measure 40 cm, 37 cm and 20 cm. Calculate the size of the smallest angle to 1 decimal place.

5 Show that for an equilateral triangle, with sides of length x cm, $\cos A = \frac{1}{2}$.

6 Calculate the height of the balloon above the ground.

420 m
460 m
540 m

Answers

1 a 111.8°

    b 84.1°

    c 56.6°

    d 88.6°

2 71.3°

3 20.2°

4 29.8°

5 $\cos(A) = \dfrac{x^2 + x^2 - x^2}{2x^2} = \dfrac{1}{2}$

6 346.5 m

Dec 18-14:20