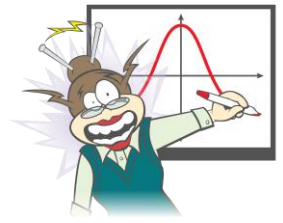# Webinar problems: Geometry & Measurement

**Author:** Danijela Draskovic

Each of the questions included here can be solved using either the TI-Nspire CX or CX CAS.

## Problem 1

Convert the following:

- 2.58 km into cm
- 164 mL into L

- $3.29 m^3$ into $cm^3$
- 3.4 hours into minutes

- 1.5 inches into cm
- 7 hectares into $m^2$

Response:

## Problem 2

Emma is hiking. She walks 27 km from her starting point on a bearing of 045° until she reaches a campsite. She decides to take a small break and then continues the hike, walking 14 km on a bearing of 300° until she reaches a lake. From the lake, she turns and walks back directly to her starting point.
  a) What was the bearing from the lake to the campsite?
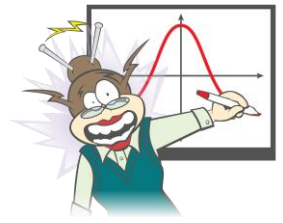  b) What is the total distance Emma has walked, in kilometres?
Response:

## Problem 3

A triangle ABC has side AB of length 5 units, side BC of length 8 units, angle ACB of 36°. Which of the following angles could not be another angle in triangle ABC?

 A: 70°             B: 74°             C: 110°             D: 34°             E: 22

Response:

## Problem 4

All towns in the state of Victoria are in the same time zone.
Mallacoota (38°S, 150°E) and Port Fairy (38°S, 142°E) are two Victorian coastal towns.
One day in August, the sun rose in Port Fairy at 7:03 am. Assuming that 15° of longitude equates to a one-hour time difference, what time was the sun was expected to rise in Mallacoota on that same day?
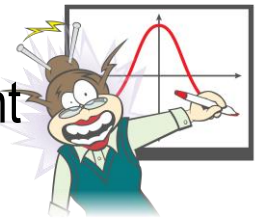
Response:

## Problem 5

A horse racing track is pictured in green.
It needs to be completely enclosed in fencing from start to end, to prevent the horses running off the track. How many metres of fencing are required to complete this project?
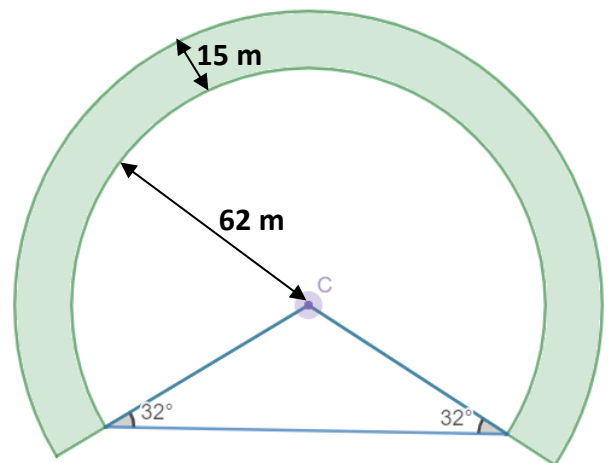


Response:

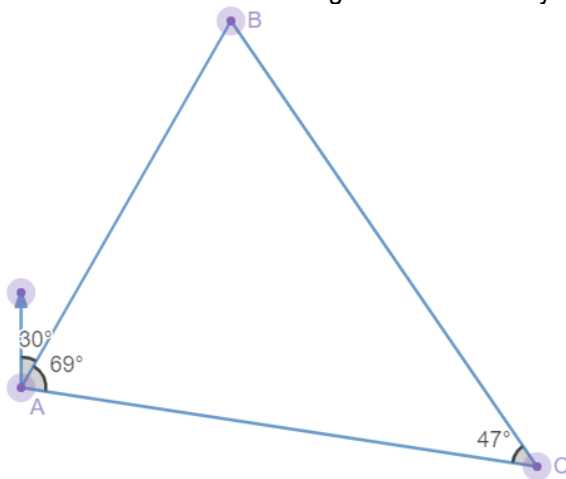# Extra Practice problems: Geometry & Measurement

## Extra Practice Problem 1

Using your CAS calculator, practice performing the following unit conversions:
- 538.02 cm into m
- 0.37 L into mL
- 4.2 hours into minutes

Response:
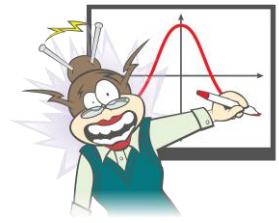
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## Extra Practice Problem 2

The course for a bush walking tour is marked by three flags; A, B and C.



Starting at flag A, the tour path heads on a bearing of 030° to flag B. From flag B, the tour then heads to flag C. The angle BAC is 69° and the angle BCA is 47°.
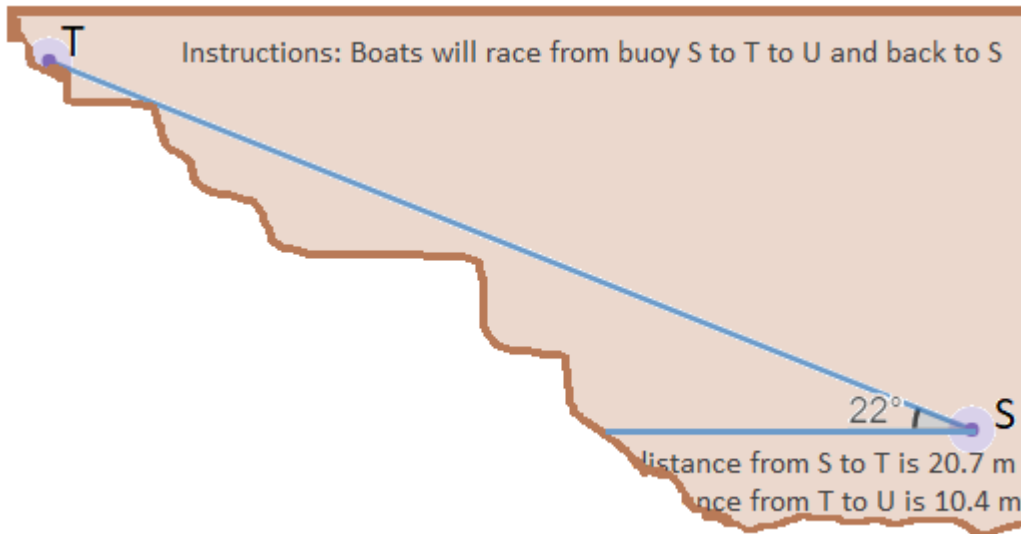   a) What is the bearing of flag B from flag C?
   b) If the distance from A to B is 1.8 km, find the total length of the course, correct to one decimal place.

Response:

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## Extra Practice Problem 3

A map of a toy boat race has been found, partially destroyed:



Instructions: Boats will race from buoy S to T to U and back to S

22°

S

T

distance from S to T is 20.7 m

nce from T to U is 10.4 m

Maths enthusiast, Jamie, wants to recreate the map.
Draw two possible scenarios for the triangular shaped race path, including all interior angles, correct to the nearest integer angle.
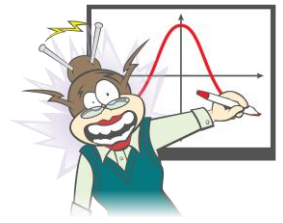
Response:

## Extra Practice Problem 4

Nikola is travelling from Melbourne (38°S, 145°E) to Seville (37°N, 5°W) on Friday, 23 July.
The flight will leave Melbourne at 6:20 am and will take 27 hours (including all stop overs) to reach Seville.
Assuming that 15° in longitude corresponds to 1 hour difference, on what day, and what time, will Nikola arrive in Seville?

Response:

# Answers

## Extra Practice Problem 1

| | | | |
|---|---|---|---|
| 538.02· _cm▶_m | | | 5.3802· _m |
| 0.37· _l▶_ml | | | 370.· _ml |
| 4.2· _hr▶_min | | | 252.· _min |

*1.1 ▶    *Doc    DEG ✕*

## Extra Practice Problem 2

a) First find the missing angle of the triangle:

*1.1 ▶    *Doc    DEG ›*

$$180 - 69 - 47 \qquad\qquad 64$$

Using the property that alternate angles are equal, we can divide the angle ABC by inserting a line that is vertical, and thus parallel to the line at A. Then we can label angle 30° and angle 34° respectively. Using the alternate angle rule once more, we can determine the 34° angle at C.
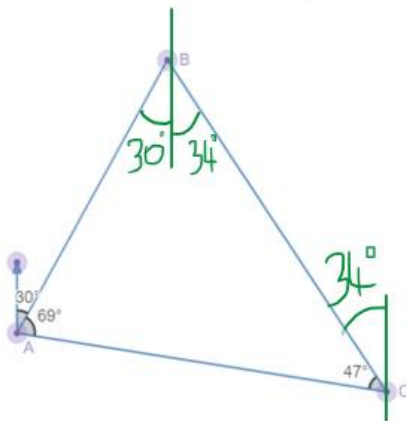


To turn this into a true bearing, we must consider that true bearings are measured clockwise and thus we need to subtract 34° from 360°. We then obtain the three-digit, true bearing of 326° from C to B.

b) Using the sine rule we obtain 6.3km.

*1.1 ▶    *Doc    DEG ✕*

$$\text{solve}\left(\frac{\sin(47)}{1.8} = \frac{\sin(69)}{x}, x\right)$$
$$x = 2.29771827773$$

$$\text{solve}\left(\frac{\sin(47)}{1.8} = \frac{\sin(64)}{y}, y\right)$$
$$y = 2.21210240648$$

$$2.2977182777288 + 2.2121024064782 + 1.8$$
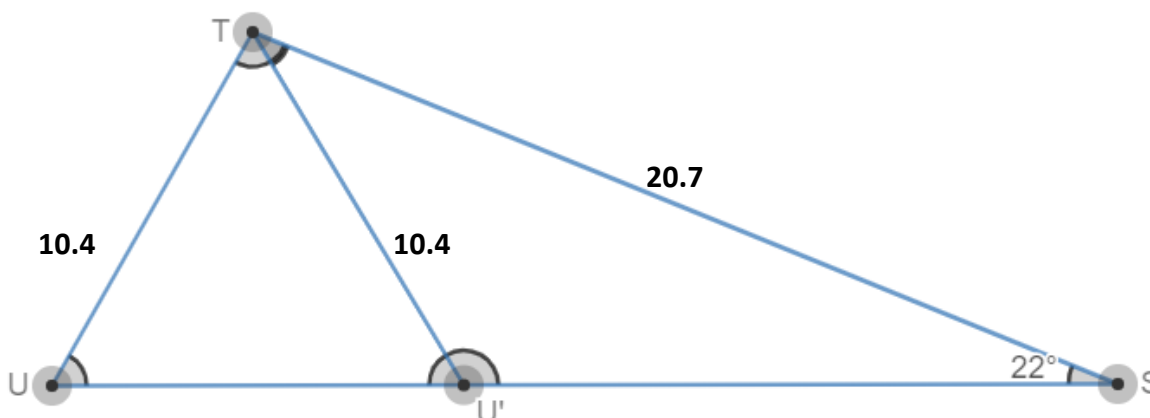$$6.30982068421$$

TEXAS INSTRUMENTS
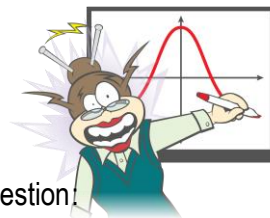
## Extra Practice Problem 3

Keep in mind the ambiguous case of the sine rule.

With the information we have, two different triangles can be drawn, and the clue is in the question!

*"Draw two possible scenarios for the triangular shaped race path"*



Using the sine rule on the CAS, we can see that the solution indicates an acute angle (corresponding with triangle STU.
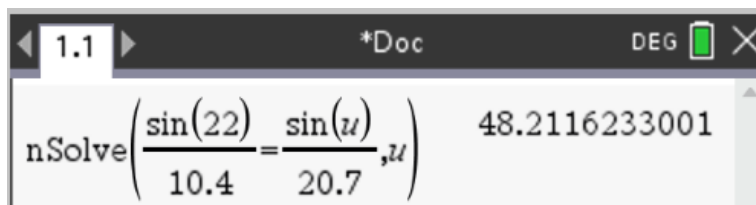


To obtain the angle formed if triangle STU' was in fact the right configuration, we would need to subtract 48.2° from 180°.

180° – 48° = 132°

The third angle in each case is found by subtracting the other two from 180°.

Triangle possibility 1: 22°, 48°, 110°

Triangle possibility 2: 22°, 132°, 26°

## Extra Practice Problem 4

6:20 am + 27 hours = 9:20 am arrival on Saturday 24th July - Melbourne time

To calculate this in Seville time:

Difference in longitude between Melbourne and Seville: 145 + 5 = 150°

The number of hours of time difference 150° corresponds to: $\frac{150}{15} = 10$

10 hours of difference, and because Seville is WEST of Melbourne, Seville is BEHIND Melbourne in time.

Therefore, arrival in Seville would be 9:20 am Saturday 24th July MINUS 10 hours

= 11:20 pm Friday 23rd July