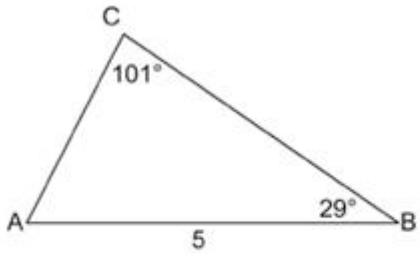
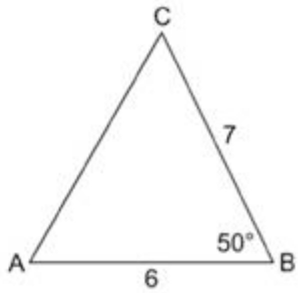
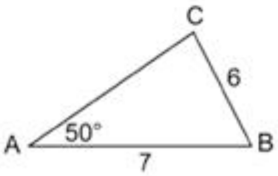
I'm So Sorry Copymaster 2

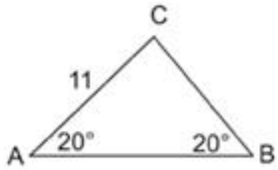
The Sine Rule II

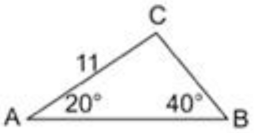
1. Find the missing sides and angles in the following triangles.

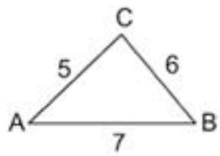












2. Find the unknown sides and angles in the following triangles.
   (i) A = 68º, b = 15, c = 10 (ii) B = 36º, C = 98º, c = 17
   (iii) a = b = 16, c = 30 (iv) A = 71º, a = 15, c = 20

3. Find the inaccessible heights or distances.
   i. The height of a tree where you know that it is 35m on the horizontal from where you are standing and its angle of elevation from your feet is 22º.
   ii. Two points can be seen from another point, X, but there is a hill between them. The distance from X to the other points is 450m and 720m, respectively. The two points form an angle of 78º with X. How far apart are the two points?
   iii. A mountain has an elevation of 30º and 50º from two points that form a horizontal line with the base of the mountain. The two points are 100m apart. What is the height of the mountain?

4. Find situations in your local area that are similar to the three situations in Question 3. Measure the angles and lengths that you need and so calculate the inaccessible distance.

Answers to Copymaster 2

1. (i) The missing angle is 180º – 101º – 29º = 50º. This is best done by the Sine Rule (I'm So Sorry). Here a = 5 sin 50º/sin 101º = 3.90; and b = 5 sin 29º/sin 101º = 2.47.

   (ii) It's best here to get the third side using the Cosine Rule and then use the Sine Rule to find the angles.
   b2 = 62 + 72 – 2 x 6 x 7 cos 50º = 31.00. So b = 5.57.
   sin A = 7 sin 50/5.57 = 0.963. So A = 74.30º.
   C = 180º – 50º – 74.30º = 55.70º

   (iii) sin C = 7 sin 50º/6 = 0.89. So C = 63.34º.
   Hence B = 180º – 50º – 63.34º = 66.66º.
   b = 6 sin 66.66º/sin 50º = 7.19.

   (iv) Since A = B, a = b. So a = 11.
   Now C = 140º. So c = 11 sin 140º/sin 20º = 20.67.

   (v) C = 120º. By the Sine Rule, a = 5.85 and c = 14.82.

   (vi) Use the Cosine Rule to find the first angle. The second angle can then be found either by the Cosine Rule or the Sine Rule (although the latter is probably slightly easier as far as computation goes).
   cos C = 0.2, so C = 78.46º.
   Then B = 44.41º. Hence A = 67.13º.

2. (i) Use the Cosine Rule to get a, and then you can use either Rule to get B or C.
   a = 14.58; B = 72.53º; C = 39.47º

   (ii) Use the Sine Rule. A = 46º; a = 12.35; b = 10.09.

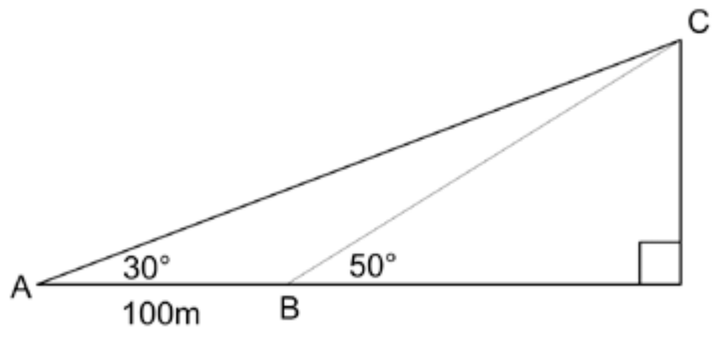
   (iii) Use the Cosine Rule to find C. Note that A = B. C = 139.27º; A = B = 20.37º.

   (iv) Using either Rule leads to some strange results. It turns out that there is no such triangle. Why? (If we keep A fixed, what values of a will give us a triangle? On the other hand, if we keep a fixed, what values of A will give us a triangle?)

3. (i) The height is 35 tan 22º = 14.14m.

   (ii) This is a direct application of the Cosine Rule. The distance is 765.62m.

   (iii)



From the diagram we can quickly see that B = 150º and C = 1º. Then by the Sine Rule, b = 2864.93. Then the height of the mountain is 2864.93 sin 29º = 1388.49m.