Applications of Trigonometry
Conventional Questions

1. [14-15 Final Exam, #2]

In **Figure 1**, *AB* and *CD* are the vertical heights of a building and a tree respectively. The angles of depression of *C* and *D* from *A* are 50° and 60° respectively and *AB* = 60 m.

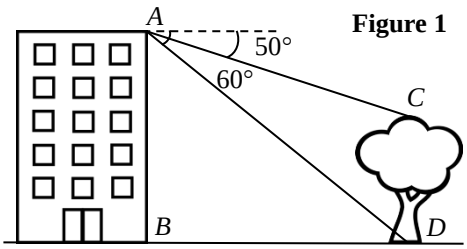


Figure 1

(a) Find the horizontal distance between the building and the tree. **(2 marks)**

(b) Find the height of the tree. **(2 marks)**

2. [14-15 Final Exam, #12]

Alice and Kitty walk from town *A* to town *C* by two different routes. Alice first walks 80 m to *B* in a direction of 300°, then she walks 130 m to *C* in a direction of 200°. Kitty first walks due south to *D*, then she walks due west to *C*.

(a) Sketch the routes of Alice and Kitty in **Figure 6**. **(1 mark)**

(b) Find the distance travelled by Kitty. **(3 marks)**

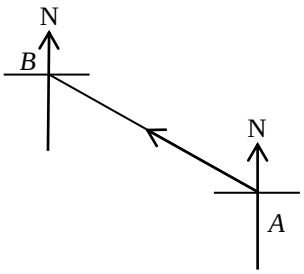


Figure 6

3. [15-16 Final Exam, #7]

In **Figure 2**, the scale of the map is 1 : 5 000. *AB* is a straight road and is measured to be 2.5 cm long on the map.

(a) Find the gradient of *AB*. **(2 marks)**

(b) Find the inclination of *AB*. **(1 mark)**

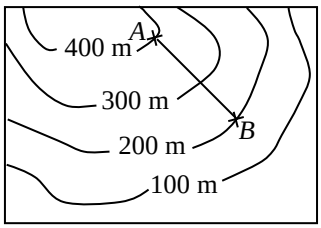
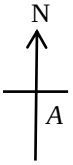


Figure 2

4. [15-16 Final Exam, #16]

Peter walks 150 m to the library *B* in a direction of 300° from his home *A*, and then walks 250 m in a direction of 225° to a church *C*.

(a) Sketch the route. **(1 mark)**



(b) Find the shortest distance between his home *A* and the church *C*. **(3 marks)**

5. [16-17 Final Exam, #16]

In **Figure 6**, a car travels from town *P* in a direction of S32°W towards town *Q* which is 45 km away. Several hours later, the car leaves *Q* and goes to town *R*. The bearings of *R* from *P* and *Q* are S9°E and S58°E respectively. Find the distance between town *Q* and town *R*? **(3 marks)**

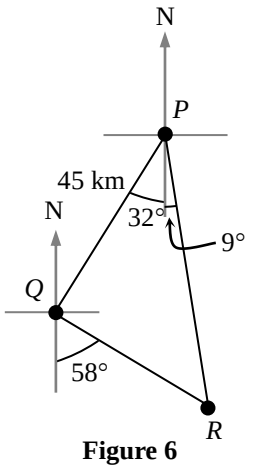


Figure 6

6. [17-18 Final Exam, #15]

Ben is playing a mobile phone game in which monsters can be detected within a distance of 200 m. The compass bearing of a fixed monster *P* from Ben's home *Q* is S68°W. After walking due west for 400 m to the library *R*, the compass bearing of monster *P* from Ben is S24°W. Ben continues walking due west and he is nearest to monster *P* at *T*. Can he detect monster *P* at *T*? Explain your answer. **(3 marks)**

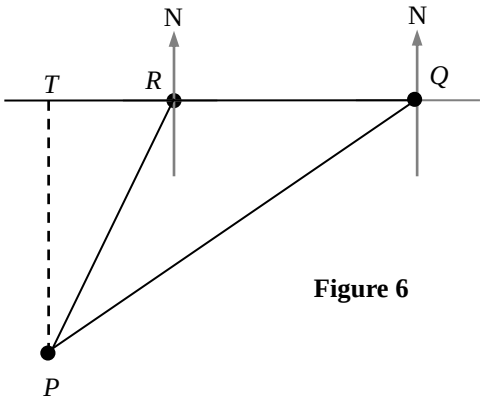


Figure 6

7. [17-18 Final Exam, #16]

In **Figure 7a**, *O*, *A* and *B* are 3 points on the horizontal ground. It is given that OA = 6 m and $OB = 6\sqrt{3}$ m. The true bearings of *O* from *A* and *B* are 340° and 250° respectively.

(a) Write down $\angle AOB$. Hence find *AB*.

(b) In **Figure 7b**, *OP* is a vertical lamp with height 3 m which is located at *O* and *AB* is a road. *C* is a point on *AB* such that it has the shortest distance from the lamp.

(i) Name the angle between *AP* and ΔOAB. **(1 mark)**

(ii) Name the angle between ΔPAB and ΔOAB. **(1 mark)**

(iii) Hence, find the angle between ΔPAB and ΔOAB.

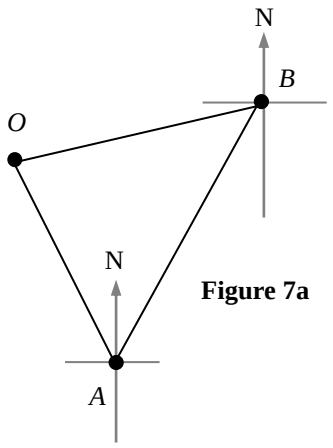


Figure 7a

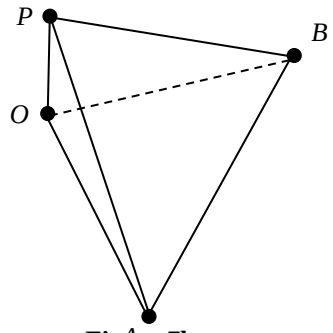
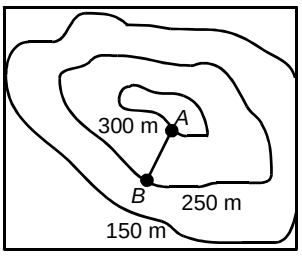


Figure 7b

8. [18-19 Standardized Test 2, 2]

Figure 2 shows a contour map of the scale 1 : 100 000. *AB* is a straight road, where *A* is on the contour line 300 m and *B* is on the contour line 250 m. *AB* is measured to be 3 cm long on the map. Find the gradient of *AB* in the form 1 : *n*.

(2 marks)



9. [18-19 Final Exam, 13]

In **Figure 6**, Lighthouse *B* is 50 km due East of Lighthouse *A*, while Pier *C* is 40 km due North of Lighthouse *A*.

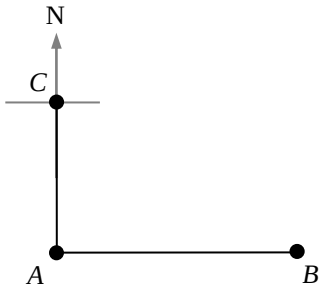


Figure 6

(a) Find the true bearing of Lighthouse *B* from the Pier *C*. **(2 marks)**

(b) A ship starts travelling at a bearing of N38°E from Lighthouse *A* with a speed of 25 km/h at 9:00 a.m. When will the distance between the ship and Lighthouse *B* be the shortest? Give the answer correct to the nearest minute. **(3 marks)**

10. [18-19 Final Exam, 14]

In **Figure 7**, Joe is standing on the ground at point *A* and *AC* is a slope of gradient 9 : 40. *B* is a point on the ground vertically below *C*. It is given that the distance between *A* and *B* is 8 m.

(a) Find the length of *BC*. **(2 marks)**

(b) It is given that the eye level of Joe above the ground (*h* m) equals to the length of *BC*. Joe walks along the slope *AC* for 4.92 m to *D*.

(i) Write down the length of *CD*. **(1 mark)**

(ii) The angle of elevation of the top *T* of a tree *TC* from Joe's eyes is now 62°. Find the height of the tree *TC*. **(3 marks)**

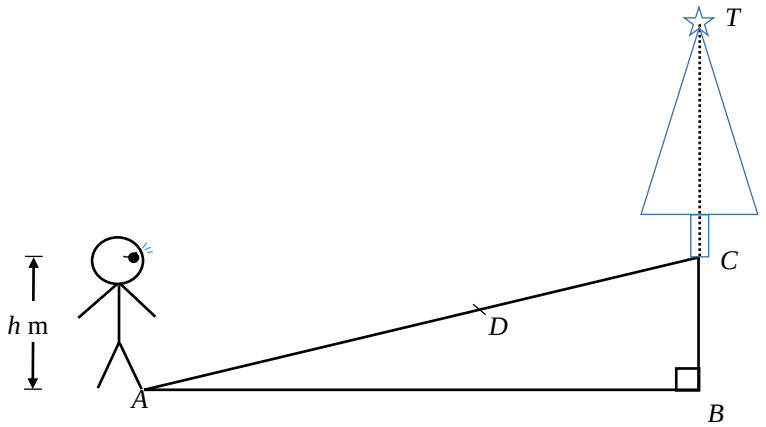


Figure 7