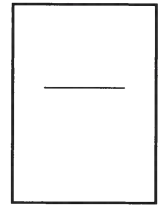


- Provided diagrams are not drawn to scale



**Part A - Multiple Choice (all answers are rounded to one decimal place) – 15 marks**

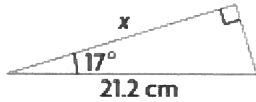
e

1. A ladder with a length of 4 m is leaning against a building. The bottom of the ladder is 1.5 m from the base of the building. What acute angle does the ladder make with the ground?

- a)  $69.4^\circ$       b)  $20.6^\circ$       c)  $22.0^\circ$       d)  $70.1^\circ$       e)  $68.0^\circ$       f) None of the above

a

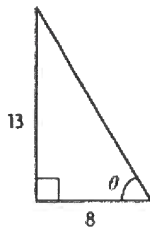
2. Solve for  $x$ :



- a) 20.3      b) 14.7      c) 13.8      d) 17.8      e) 21.9      f) None of the above

e

3. Solve for  $\theta$ :



- a)  $52.0^\circ$       b)  $37.8^\circ$       c)  $28.8^\circ$       d)  $31.6^\circ$       e)  $58.4^\circ$       f) None of the above

a

4. What is the value of  $\cot 73^\circ$  (rounded to 4 decimal places)

- a) 0.3057      b) 0.3004      c) 3.2709      d) 0.2998      e) 1.1231      f) None of the above

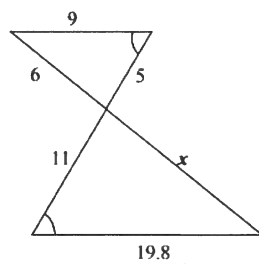
c

5. Solve for  $\theta$  where  $0^\circ \leq \theta \leq 90^\circ$ :  $\csc \theta = \frac{3}{2}$

- a)  $46.9^\circ$       b)  $45.3^\circ$       c)  $41.8^\circ$       d)  $42.2^\circ$       e)  $50.3^\circ$       f) No Solution

d

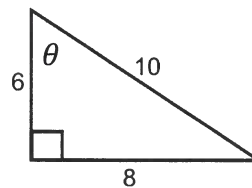
6. Solve for  $x$ :



- a) 9.2      b) 11      c) 12.2      d) 13.2      e) 14.6      f) None of the above

f

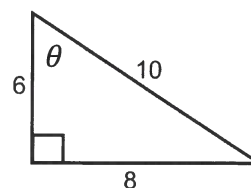
7. For the right triangle provided what would  $\tan \theta$  equal?



- a)  $\tan \theta = \frac{4}{5}$       b)  $\tan \theta = \frac{5}{4}$       c)  $\tan \theta = \frac{3}{5}$       d)  $\tan \theta = \frac{3}{4}$       e)  $\tan \theta = \frac{5}{3}$       f) None of the above

e

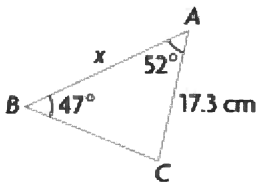
8. For the right triangle provided what would  $\sec \theta$  equal?



- a)  $\sec \theta = \frac{4}{5}$       b)  $\sec \theta = \frac{5}{4}$       c)  $\sec \theta = \frac{3}{5}$       d)  $\sec \theta = \frac{3}{4}$       e)  $\sec \theta = \frac{5}{3}$       f) None of the above

B

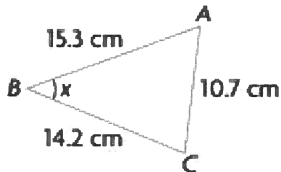
9. Solve for  $x$ :



- a) 32.1      b) 23.4      c) 18.1      d) 21.1      e) 19.6      f) None of the above

D

10. Solve for  $x$ :



- a)  $46.9^\circ$       b)  $45.3^\circ$       c)  $41.8^\circ$       d)  $42.3^\circ$       e)  $50.3^\circ$       f) No Solution

B

11. Any triangle that is not a right-angle triangle is called \_\_\_\_\_ triangle.

- a) an acute      b) an oblique      c) an obtuse      d) an isosceles      e) a scalene      f) None of the above

B

12. How many possible triangles can be formed using the given measurements:  $\triangle ABC$ ,  $\angle A = 75^\circ$ ,  $b = 7$ ,  $a = 8$

- a) 0 possible      b) 1 possible      c) 2 possible      d) 3 possible      e) 4 possible      f) None of the above

B

13. How many possible triangles can be formed using the given measurements:  $\triangle CDE$ ,  $\angle C = 100^\circ$ ,  $d = 15$ ,  $c = 20$

- a) 0 possible      b) 1 possible      c) 2 possible      d) 3 possible      e) 4 possible      f) None of the above

C

14. How many possible triangles can be formed using the given measurements:  $\triangle PQR$ ,  $\angle P = 50^\circ$ ,  $r = 13.6$ ,  $p = 12.2$

- a) 0 possible      b) 1 possible      c) 2 possible      d) 3 possible      e) 4 possible      f) None of the above

E

15. Which of the following would NOT be considered a Pythagorean triple?

- a) 3, 4, 5      b) 5, 12, 13      c) 8, 15, 17      d) 6, 8, 10      e) 4, 6, 7      f) None of the above

### Part B – Full Solutions

1. Solve  $\triangle DEF$ , when  $d = 4$ ,  $\angle E = 30^\circ$ , and  $f = 20$ . (4 marks) - round to 1 decimal place

$\angle D = 6.9^\circ$	$d = 4$
$\angle E = 30^\circ$	$e = 16.7$
$\angle F = 143.1^\circ$	$f = 20$

$$e^2 = 4^2 + 20^2 - 2(4)(20)\cos 30^\circ$$

$$e \approx 16.7$$

$$\frac{\sin D}{4} = \frac{\sin 30^\circ}{16.7}$$

$$\angle D \approx 6.9^\circ$$

$$\angle F \approx 180^\circ - (6.9^\circ + 30^\circ)$$

$$\angle F \approx 143.1^\circ$$

7

4

11

2. A dog, a cat, and a rabbit are waiting to greet their owner as shown in the diagram. The dog is 4.2 m from the cat and 2.2 m from the rabbit. The dog must turn his head  $90^\circ$  to go from looking at the cat to looking at the rabbit. He sees the door at an angle of  $38^\circ$  while turning his head in this way. Meanwhile, the cat must turn its head  $70^\circ$  to go from looking at the dog to looking at the door. (4 marks) - round to 1 decimal place

a) How far is the rabbit from the door? - round to 1 decimal place

b) The owner walks through the door and the cat doesn't move but the rabbit and the dog take off at the same time to meet her. If the dog runs at 6.5 m/s and the rabbit hops at 6.0 m/s, which animal will reach the owner first?

$$a) \frac{d}{\sin 70^\circ} = \frac{4.2}{\sin 72^\circ}$$

$$d = 4.15$$

$$r^2 = 2.2^2 + d^2 - 2(2.2)d \cos 52^\circ$$

$$r = 3.29$$

$\therefore$  The rabbit is about 3.29 m from the door.

$$(3.3 \text{ m})$$

(Rounded to 1 decimal place)

$$t = \frac{d}{v}$$

$$b) t_{\text{RABBIT}} = \frac{3.3}{6.0}$$

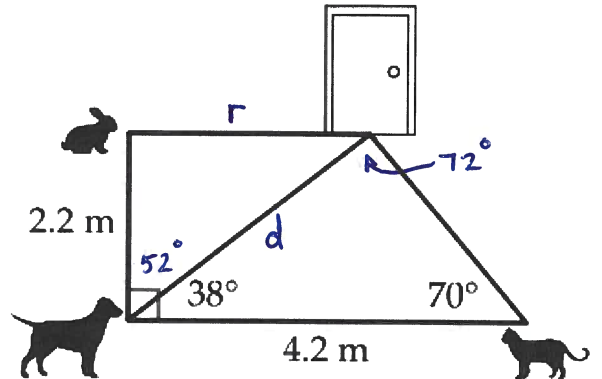
$$= 0.55 \text{ seconds}$$

$$t_{\text{DOG}} = \frac{4.15}{6.5}$$

$$= 0.64 \text{ seconds}$$

4

$\therefore$  The rabbit will reach the owner first



3. Determine the height of the tree? (3 marks) - round to 1 decimal place

$$\tan 57^\circ = \frac{h}{x}$$

$$\tan 68^\circ = \frac{h}{y}$$

$$x = \frac{h}{\tan 57^\circ}$$

$$y = \frac{h}{\tan 68^\circ}$$

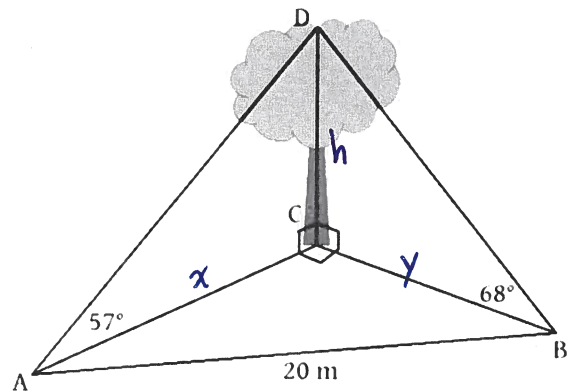
$$x^2 + y^2 = 20^2$$

$$\left(\frac{h}{\tan 57^\circ}\right)^2 + \left(\frac{h}{\tan 68^\circ}\right)^2 = 400$$

$$h = 683.799$$

$$h = 26.1 \text{ m}$$

$\therefore$  The tree is 26.1 m tall.



3. Find  $\angle A$  for  $\triangle ABC$ , when  $\angle B = 42^\circ$ ,  $a = 27$ , and  $b = 25$  (3 marks) - round to 1 decimal place

$$\frac{\sin A}{27} = \frac{\sin 42^\circ}{25}$$

$$\sin A = 0.7227$$

$$\angle A = 46.3^\circ \text{ or } \angle A = 180^\circ - 46.3^\circ = 133.7^\circ$$

4. Determine  $\angle BAC$  for in tetrahedron  $ABCD$ : (3 marks) - round to 1 decimal place

$$a^2 = 18^2 + 14^2 - 2(18)(14)\cos 95^\circ$$

$$a \approx 23.7$$

$$b^2 = 14^2 + 15^2$$

$$b \approx 20.5$$

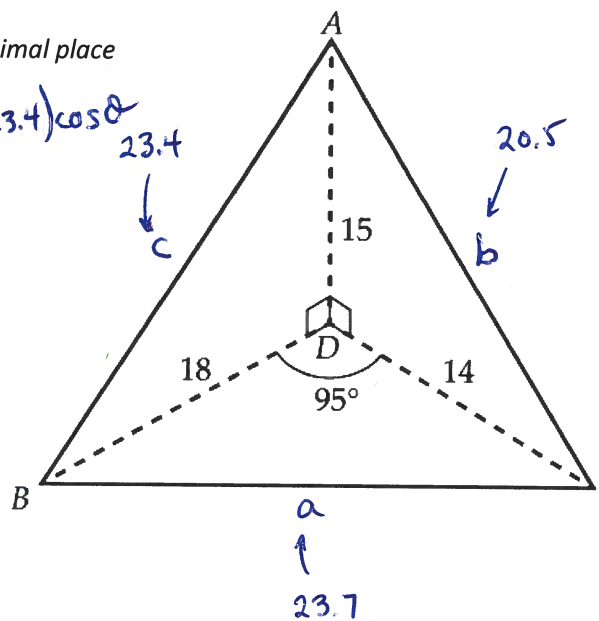
$$c^2 = 18^2 + 15^2$$

$$c \approx 23.4$$

$$23.7^2 = 20.5^2 + 23.4^2 - 2(20.5)(23.4)\cos \theta$$

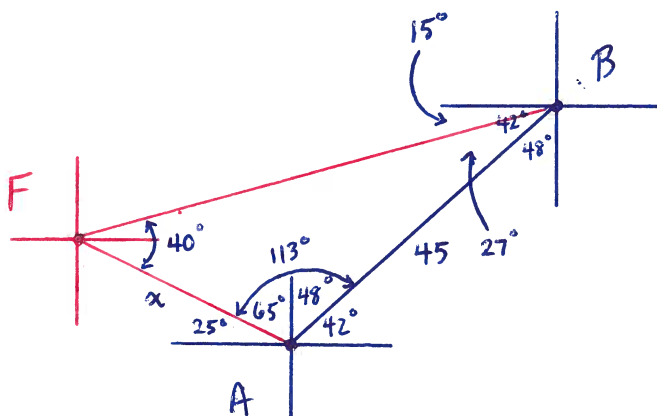
$$\theta \approx 65.0^\circ$$

$\therefore \angle BAC$  is about  $65.0^\circ$



3

5. A ranger in fire tower A spots a fire at a bearing of  $295^\circ$ . A ranger in fire tower B spots the same fire at a bearing of  $255^\circ$ . From tower A, tower B has a bearing of  $48^\circ$  and is located 45km away. How far from tower A is the fire? (3 marks) - round to 1 decimal place



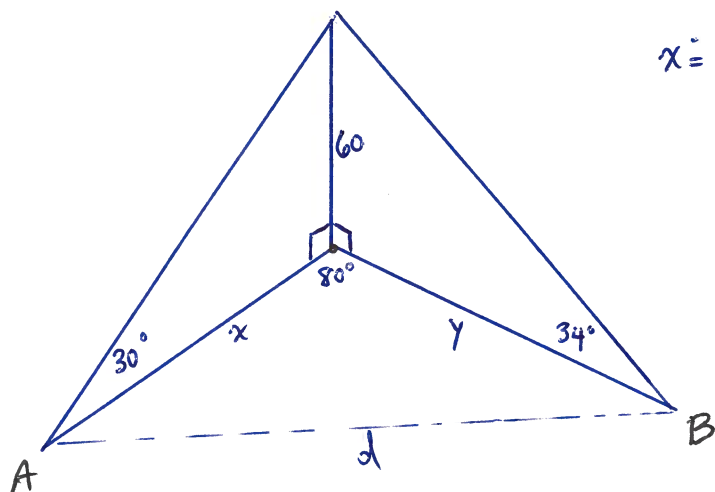
$$\text{let } \overline{FA} = x$$

$$\frac{x}{\sin 27^\circ} = \frac{45}{\sin 40^\circ}$$

$$x \approx 31.8$$

$\therefore$  Tower A is about 31.8 km from the fire.

6. From the top of a 60m high bridge, two boats are seen at anchor. Boat A has a bearing of  $200^\circ$  and an angle of depression of  $30^\circ$ . Boat B has a bearing of  $280^\circ$  and an angle of depression of  $34^\circ$ . How far apart are the boats? (4 marks) - round to 1 decimal place



$$\tan 30^\circ = \frac{60}{x}$$

$$x \approx 103.9$$

$$\tan 34^\circ = \frac{60}{y}$$

$$y \approx 88.95$$

$$d^2 = x^2 + y^2 - 2xy \cos 80^\circ$$

$$d \approx 124.5$$

$\therefore$  The boats are about 124.5m apart.

4