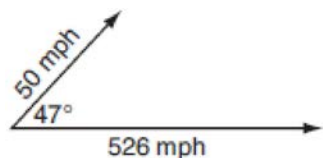


**A2.A.73: Vectors: Solve for an unknown side or angle, using the Law of Sines or the Law of Cosines**

- 1 A tractor stuck in the mud is being pulled out by two trucks. One truck applies a force of 1,200 pounds, and the other truck applies a force of 1,700 pounds. The angle between the forces applied by the two trucks is  $72^\circ$ . Find the magnitude of the resultant force, to the *nearest pound*.
- 2 Forces of 40 pounds and 70 pounds act on a body at an angle measure  $60^\circ$ . Find the magnitude of the resultant of these forces to the *nearest hundredth of a pound*.
- 3 Two equal forces act on a body at an angle of  $80^\circ$ . If the resultant force is 100 newtons, find the value of one of the two equal forces, to the *nearest hundredth of a newton*.
- 4 The measures of the angles between the resultant and two applied forces are  $65^\circ$  and  $42^\circ$ , and the magnitude of the resultant is 24 pounds. Find, to the *nearest pound*, the magnitude of the larger force.
- 5 Two forces act on a body to produce a resultant force of 70 pounds. One of the forces is 50 pounds and forms an angle of  $67^\circ 40'$  with the resultant force. Find, to the *nearest pound*, the magnitude of the other force.
- 6 The measures of the angles between the resultant and two applied forces are  $60^\circ$  and  $45^\circ$ , and the magnitude of the resultant is 27 pounds. Find, to the *nearest pound*, the magnitude of each applied force.
- 7 Two tow trucks try to pull a car out of a ditch. One tow truck applies a force of 1,500 pounds while the other truck applies a force of 2,000 pounds. The resultant force is 3,000 pounds. Find the angle between the two applied forces, rounded to the *nearest degree*.
- 8 One force of 20 pounds and one force of 15 pounds act on a body at the same point so that the resultant force is 19 pounds. Find, to the *nearest degree*, the angle between the two original forces.
- 9 Two forces of 14 and 30 act on a body forming an obtuse angle with each other. If the resultant force has a magnitude of 20, find the angle between the two forces to the *nearest degree*.
- 10 Two forces of 130 and 150 pounds yield a resultant force of 170 pounds. Find, to the *nearest ten minutes* or *nearest tenth of a degree*, the angle between the original two forces.
- 11 Two forces of 80 pounds and 100 pounds yield a resultant force of 60 pounds. Find, to the *nearest ten minutes* or the *nearest tenth of a degree*, the angle between the two forces.
- 12 Two forces of 50 pounds and 69 pounds act on a body to produce a resultant of 70 pounds. Find, to the *nearest tenth of a degree* or *nearest ten minutes*, the angle formed between the resultant and the smaller force.
- 13 Two forces of 30 pounds and 40 pounds act upon a body, forming an acute angle with each other. The angle between the resultant and the 30-pound force is  $35^\circ 10'$ . Find, to the *nearest ten minutes*, the angle between the two given forces.
- 14 Two forces of 40 pounds and 55 pounds act on a body, forming an acute angle with each other. The angle between the resultant and the 40-pound force is  $22^\circ 20'$ . Find, to the *nearest ten minutes*, the angle between the two given forces.
- 15 Two forces of 42 pounds and 65 pounds act on a body at an acute angle with each other. The angle between the resultant force and the 42-pound force is  $38^\circ$ . Find, to the *nearest degree*, the angle formed by the 42-pound and the 65-pound forces.

- 16 Two forces of 25 newtons and 85 newtons acting on a body form an angle of  $55^\circ$ . Find the magnitude of the resultant force, to the *nearest hundredth of a newton*. Find the measure, to the *nearest degree*, of the angle formed between the resultant and the larger force.
- 17 Two forces of 40 pounds and 20 pounds, respectively, act simultaneously on an object. The angle between the two forces is  $40^\circ$ . Find the magnitude of the resultant, to the *nearest tenth of a pound*. Find the measure of the angle, to the *nearest degree*, between the resultant and the larger force.
- 18 A jet is flying at a speed of 526 miles per hour. The pilot encounters turbulence due to a 50-mile-per-hour wind blowing at an angle of  $47^\circ$ , as shown in the accompanying diagram.



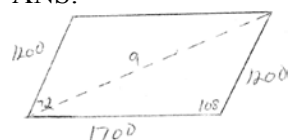
Find the resultant speed of the jet, to the *nearest tenth of a mile per hour*. Use this answer to find the measure of the angle between the resultant force and the wind vector, to the *nearest tenth of a degree*.

- 19 Two forces act on a body at an angle of  $100^\circ$ . The forces are 30 pounds and 40 pounds. Find the magnitude of the resultant force to the *nearest tenth of a pound*. Find the angle formed by the greater of the two forces and the resultant force to the *nearest degree*.
- 20 Two forces of 25 pounds and 38 pounds act on a body at an angle of  $74.5^\circ$ . Find, to the *nearest tenth of a pound*, the magnitude of the resultant force. Using this answer, find the angle between the resultant and the larger force to the *nearest tenth of a degree*.
- 21 Two forces of 35 pounds and 70 pounds act on a body. The angle between the two forces is  $40^\circ$ . Find the magnitude of the resultant force to the *nearest tenth of a pound*. Using this answer, determine, to the *nearest degree*, the angle between the resultant and the larger force.
- 22 Two forces act on an object. The first force has a magnitude of 85 pounds and makes an angle of  $31^\circ 30'$  with the resultant. The magnitude of the resultant is 130 pounds. Find the magnitude of the second force to the *nearest tenth of a pound*. Using this answer, find, to the *nearest ten minutes* or *nearest tenth of a degree*, the angle that the second force makes with the resultant.
- 23 Two forces are applied to an object. The measure of the angle between the 30.2-pound applied force and the 50.1-pound resultant is  $25^\circ$ . Find the magnitude of the second applied force to the *nearest tenth of a pound*. Using this answer, find the measure of the angle between the second applied force and the resultant to the *nearest degree*.
- 24 Gerardo and Bennie are pushing a box. Gerardo pushes with a force of 50 pounds in an easterly direction, and Bennie pushes with a force of 39 pounds in a northeasterly direction. The resultant force forms an angle of  $32^\circ$  with the 39-pound force. Find the angle between the 50-pound force and the 39-pound force, to the *nearest tenth of a degree*. Find the magnitude of the resultant force, to the *nearest pound*.
- 25 Two forces of 40 pounds and 28 pounds act on an object. The angle between the two forces is  $65^\circ$ . Find the magnitude of the resultant force, to the *nearest pound*. Using this answer, find the measure of the angle formed between the resultant and the *smaller* force, to the *nearest degree*.

# A2.A.73: Vectors: Solve for an unknown side or angle, using the Law of Sines or the Law of Cosines

## Answer Section

1 ANS:



2364

REF: 011032b

2 ANS:

96.44

REF: 069842siii

3 ANS:

65.27

REF: 060428b

4 ANS:

23

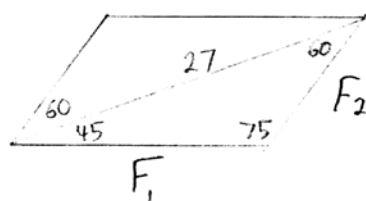
REF: 010827b

5 ANS:

69

REF: 088939siii

6 ANS:



$$\frac{27}{\sin 75} = \frac{F_1}{\sin 60} \cdot \frac{27}{\sin 75} = \frac{F_2}{\sin 45} \cdot$$

$$F_1 \approx 24 \quad F_2 \approx 20$$

REF: 061238a2

7 ANS:

63°

REF: 080228b

8 ANS:

116

REF: 010430b

9 ANS:  
146°

REF: 018738siii

10 ANS:  
105.6° or 105°40'

REF: 080042siii

11 ANS:  
143.1° or 143°10'

REF: 080239siii

12 ANS:  
67.9° or 67°50'

REF: 060041siii

13 ANS:  
60°50'

REF: 068141siii

14 ANS:  
38°20'

REF: 088740siii

15 ANS:  
61

REF: 069042siii

16 ANS:  
101.43, 12

REF: fall0939a2

17 ANS:  
56.8, 13

REF: 010734b

18 ANS:  
561.3, 43.3

REF: 060734b

19 ANS:  
45.6, 40

REF: 089640siii

20 ANS:  
50.8, 28.3

REF: 060242siii

21 ANS:  
99.4, 13

REF: 080337siii

22 ANS:  
72.7, 37.7° or 37°40'

REF: 089740siii

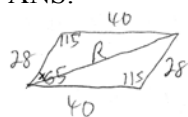
23 ANS:  
26.1, 29

REF: 080137siii

24 ANS:  
56.4, 79

REF: 060834b

25 ANS:



$$R = \sqrt{28^2 + 40^2 - 2(28)(40)\cos 115} \approx 58 \quad \frac{58}{\sin 115} = \frac{40}{\sin x}$$

$$x \approx 39$$

REF: 061439a2