

5.1 Sides of an Oblique Triangle

Answers

1. $c^2 = a^2 + b^2 - 2ab \cos C$

2. $a = 12; b = 15; C = 40^\circ$

3. $a = 12, b = 9; C = 85^\circ$

4. $a = 16; b = 13; C = 42^\circ$

5. $a = 11; b = 10; C = 30^\circ$

6. $a = 27; b = 34; C = 80^\circ$

7. $a = 20; b = 12; C = 68^\circ$

8. $a = 52; b = 65; C = 50^\circ$

9. 9.66

10. 14.36

11. 2.87

12. 5.52

13. 39.58

14. 19.08

15. 50.83

16. If the triangle is a right triangle then $C = 90^\circ$ and $\cos C = 0$. Therefore, $c^2 = a^2 + b^2 - 2ab \cos C \rightarrow c^2 = a^2 + b^2 - 2ab(0) \rightarrow c^2 = a^2 + b^2$.

5.2 Determination of Unknown Angles Using Law of Cosines

Answers

1. The smallest angle is opposite the smallest side. The largest angle is opposite the largest side.
2. You can find the measure of the third angle by using the Triangle Angle Sum Theorem (the three angles of a triangle must add to 180°).
3. 41.8°
4. 89.6°
5. 48.6°
6. 27.0°
7. 87.7°
8. 65.3°
9. 20.8°
10. 134.6°
11. 24.6°
12. 35.6°
13. 104.1°
14. 40.3°
15. 25.8°
16. 85.1°
17. 69.1°
18. 19.0°
19. 141.3°
20. 19.7°

5.3 Identify Accurate Drawings of Triangles

Answers

1. You can use the Law of Cosines to solve for the given angle and see if the two values match.
2. Yes
3. No
4. No
5. Yes
6. Yes
7. Yes
8. Yes
9. No
10. No
11. Yes
12. No
13. Yes
14. Yes
15. No such triangle exists because the longest side is longer than the sum of the shorter two sides.

5.4 Derivation of the Triangle Area Formula

Answers

1. 92.19

2. 14.7

3. 329.9

4. 10.3

5. 6.1

6. 10.3

7. 11.5

8. 5.4

9. 12.97

10. 26.8

11. 22.25

12. About 133°

13. About 6838 square feet

14. 2477.69 square feet

15. 116.7 feet

16. 40.62° and 49.38°

5.5 Heron's Formula

Answers

1. 12.52
2. 23.5
3. 65.0
4. 28.3
5. 6.9
6. 6
7. 639.2
8. 169.7
9. 173.2
10. 98.3
11. 44.0
12. 27.0
13. When you are given the three sides of a non-right triangle.
14. 194.9 square inches
15. An equilateral triangle.

5.6 Determination of Unknown Triangle Measures Given Area

Answers

1. $x=12$ in
2. $x=50$ cm
3. $x=11$ cm
4. 38 cm
5. 78.7° , 42.3° , 59°
6. $\theta=33^\circ$
7. 17.5 cm
8. 77.5 cm
9. 40 in
10. 42.3 in
11. 20.76° , 67.24°
12. $x=8$ in
13. $y=15$ in
14. $z=17$ in
15. $\theta=28.1^\circ$

5.7 Angle-Angle-Side Triangles

Answers

1. 7.8

2. 4.4

3. 9.2

4. 19.4

5. 28.5

6. 22.4

7. 562.5

8. 566

9. 9.7

10. 10.9

11. 7.9

12. 0.6

13. 20.9

14. 19.9

15. 19.3

16. 4.7

5.8 Angle-Side-Angle Triangles

Answers

1. $\angle C=73^\circ$
2. $a=4.0$
3. $b=5.8$
4. $\angle F=43^\circ$
5. $d=9.48$
6. $e=15.8$
7. $\angle G=53^\circ$
8. $b=23.9$
9. $i=27.2$
10. $\angle L=61^\circ$
11. $a=16.8$
12. $p=11$
13. $\angle U=76^\circ$
14. $s=1.9$
15. $a=21.4$

5.9 Possible Triangles with Side-Side-Angle

Answers

1. One solution
2. No solution
3. One solution
4. One solution
5. One solution
6. One solution
7. No solution
8. Two solutions
9. One solution
10. No solutions
11. Two solutions
12. $c=1.24$ or $c=7.24$
13. $c=7.23$
14. $\angle D=26.2^\circ$ or 153.8°
15. $\angle R=32.3^\circ$

5.10 Law of Sines

Answers

1. 35.2° or 144.8°
2. 22.5°
3. 22.6° or 157.4°
4. 58.9° or 121.1°
5. 65° or 115°
6. 71.8° or 108.2°
7. 63.9°
8. No solution
9. No solution
10. 51.5°
11. $b > 6.3$
12. $b < 13.8$
13. $b = 20.74$ or $b \geq 21$
14. Bill is 2.52 miles from school and Connie is 3.1 miles from school.
15. About 0.62 miles

5.11 Law of Cosines

Answers

1. 36.7
2. 48.3
3. 95
4. 118.7
5. 27.1
6. 34.2
7. 16.9
8. 79.5
9. 39.5
10. 4.4 miles
11. 47.1
12. 560 feet
13. Yes
14. No
15. Yes

5.12 General Solutions of Triangles

Answers

1. SAS, Law of Cosines, one solution.
2. SSS, Law of Cosines, one solution.
3. ASA, Law of Sines, one solution.
4. SSA, Law of Cosines, two solutions.
5. AAS, Law of Sines, one solution.
6. $\angle A=45^\circ$, $\angle B=64^\circ$, $\angle C=71^\circ$
7. $\angle D=44^\circ$, $e=10.8$, $\angle F=97^\circ$
8. $\angle R=35^\circ$, $r=11.5$, $p=18.1$
9. $l=4.6$, $\angle N=42^\circ$, $\angle M=21.8^\circ$
10. $\angle V=86^\circ$, $v=15.6$, $e=10.9$
11. Not possible
12. $\angle W=30^\circ$, $\angle R=56^\circ$, $\angle S=94^\circ$
13. $\angle P=18^\circ$, $d=20.4$, $l=24.3$
14. $\angle X=54.6^\circ$, $\angle Y=78^\circ$, $\angle Z=47.4^\circ$
15. $a=23.5$, $\angle F=42^\circ$, $\angle M=39^\circ$

5.13 Directed Line Segments

Answers

1. The magnitude is the length of the vector while the direction is its orientation with respect to a horizontal axis.
2. Use the distance formula.
3. Use inverse tangent of the difference between the y coordinates divided by the difference between the x coordinates.
4. Two vectors are equal if they have the same magnitude and direction.
5. $\sqrt{53}$
6. 18.43°
7. 5
8. 23.2°
9. Magnitude: $\sqrt{17}$; Direction: 75.96°
10. Magnitude: $2\sqrt{17}$; Direction: 75.96°
11. Magnitude: $\sqrt{10}$; Direction: 161.57°
12. Magnitude: $4\sqrt{2}$; Direction: 315°
13. No
14. Yes
15. No

5.14 Vector Addition

Answers

1. (5, 7)

2. $\sqrt{74}$

3. 54.46°

4. (6, 5)

5. $\sqrt{61}$

6. 39.8°

7. (2, 4)

8. $2\sqrt{5}$

9. 63.43°

10. (9, 7)

11. $\sqrt{130}$

12. 37.88°

13. (-2, 6)

14. $2\sqrt{10}$

15. 108.44°

16. Magnitude: $6\sqrt{74}$; Direction: 35.54°

5.15 Vector Subtraction

Answers

1. $(-3, 3)$

2. $3\sqrt{2}$

3. 135°

4. $(2, 1)$

5. $\sqrt{5}$

6. 26.6°

7. $(4, 0)$

8. 4

9. 0°

10. $(1, 3)$

11. $\sqrt{10}$

12. 71.6°

13. $(4, 4)$

14. $4\sqrt{2}$

15. 45°

5.16 Resultant of Two Displacements

Answers

1. $5\sqrt{37}mph$
2. $N9.46^\circ W$
3. 60.83 miles
4. 70.83 miles
5. 63.25 miles
6. 25 cm/s
7. 53.13°
8. 45.83 cm/s
9. 1620 meters
10. 500.9 mph
11. $W3.43^\circ N$
12. 2003.6 miles
13. About 5 hours, 59.4 minutes
14. 199.19 mph
15. 115 mph

5.17 Vector Multiplied By a Scalar

Answers

1. (2, 10)
2. (2, 1)
3. (6, 30)
4. (16, 13)
5. (15.4, 11.4)
6. (-2, -3)
7. (7, 18)
8. (12, 0)
9. (14.25, 11.5)
10. (21, 13)
11. (17, 21)
12. (-2, 4)
13. (6, 14)
14. (2.3, 1.9)
15. (2.4, 31.2)

5.18 Translation of Vectors and Slope

Answers

1. (5, -6)

2. (-1, -8)

3. (-12, 6)

4. (5, -2)

5. (0, 6)

6. (6, -6)

7. $\frac{7}{6}$

8. 2

9. -2

10. $\frac{8}{5}$

11. 3

12. horizontal: 0; vertical: 8

13. horizontal: 2; vertical: 10

14. horizontal: 10; vertical: 3

15. horizontal: 4; vertical 2

5.19 Unit Vectors and Components

Answers

1. The horizontal component is the product of the magnitude and the cosine of the angle. The vertical component is the product of the magnitude and the sine of the angle.
2. horizontal: -1.04; vertical: 5.9
3. horizontal: 1.5; vertical: 2.6
4. horizontal: 0.21; vertical: 1.98
5. horizontal: 4.24; vertical: 2.65
6. horizontal: 1.4; vertical: 1.4
7. horizontal: 2.4; vertical: 6.6
8. horizontal: 289; vertical: 345
9. horizontal: 28; vertical: 10.3
10. horizontal: 250; vertical: -443
11. horizontal: -407; vertical: 235
12. 479 mph
13. East: 45; North: 21
14. $-\frac{4}{5}\hat{i} + \frac{3}{5}\hat{j}$
15. $\frac{5}{\sqrt{26}}\hat{i} + \frac{1}{\sqrt{26}}\hat{j}$

5.20 Resultant as the Sum of Two Components

Answers

1. $\langle 60.3, 24.3 \rangle$
2. $\langle 32.8, 8.8 \rangle$
3. $\langle -27.3, 9.9 \rangle$
4. $\langle 76.6, -64.28 \rangle$
5. $\langle -300.7, -109.4 \rangle$
6. $\langle -5.13, 14.1 \rangle$
7. $\langle 1.74, 9.8 \rangle$
8. $\langle 30.8, -8.5 \rangle$
9. $\langle 85.7, 15.1 \rangle$
10. $\langle -36.4, 21 \rangle$
11. magnitude: $4\sqrt{13}$; direction: 33.7°
12. magnitude: $2\sqrt{58}$; direction: 23.2°
13. magnitude: $3\sqrt{73}$; direction: 69.4°
14. yes
15. Use the Pythagorean Theorem to find its magnitude and inverse tangent to find the direction.

5.21 Resultant as Magnitude and Direction

Answers

1. 34.63
2. 25.2°
3. 89.5
4. 50.4°
5. 39.2
6. 38.7°
7. 55.83
8. 61.88°
9. 199.6
10. 22.57°
11. 117.8
12. 5.85°
13. 400.9; 28.76°
14. 12.45; 51.9°
15. 12.93; 37.9°