

Pythagorean Theorem, Distance and Midpoints Chapter Questions

1. How is the formula for the Pythagorean Theorem derived?
2. What type of triangle uses the Pythagorean Theorem?
3. What types of lines do we need to use the distance and midpoint formulas for?

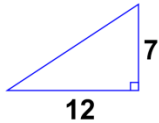
Pythagorean Theorem, Distance & Midpoints Chapter Problems

ROUND ALL ANSWERS TO THE NEAREST TENTH

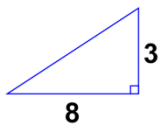
Pythagorean Theorem
Classwork

What is the length of the third side?

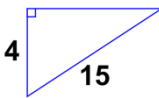
1.



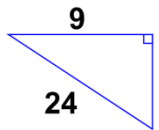
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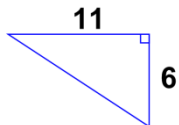
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4.



5.



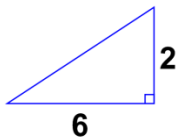
6. The legs of a right triangle have lengths of 4.5 and 7.0. What is the length of the hypotenuse?
7. The hypotenuse of a right triangle has a length of 15 and one leg has a length of 3.5. What is the length of the other leg?
8. What is the length of the hypotenuse if the legs of a right triangle are 6.5 cm and 8.25 cm?
9. Name two sets of Pythagorean Triplets.
10. Determine if each of the following sets of three numbers could be the sides to a right triangle.
 - a. 5,5,10
 - b. 18,80,82
 - c. 19,23,21
 - d. 1.25,3,3.25
 - e. 26,10,24
11. One house is 15 miles due north of the park. Another house is 9 miles due east of the park. How far apart are the houses from each other?
12. An equilateral triangle has sides of 30 cm. What is the height of the triangle?

13. The foot of a ladder is put 5 feet from the wall. If the top of the ladder is 10 feet from the ground, how long is the ladder?
14. A TV measures 36 inches long and the diagonal is 42 inches. How high is the TV?
15. If you drive your car 20 miles south and then 4.5 miles east, how far are you from your starting point?
16. Find the height of a pyramid whose slant height is 26 cm and base length is 48 cm.
17. Find the slant height of a pyramid whose base length is 48 m and height is 7 m.
18. Find the base length of a pyramid whose height is 8 in and slant height 17 in.
19. A 20 foot ladder is placed 12 feet from the wall. How high up the wall will the ladder reach?¹

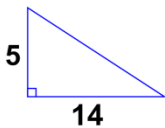
Homework

What is the length of the third side?

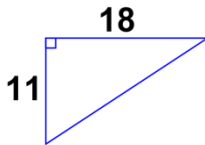
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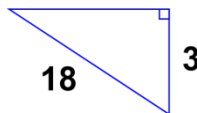
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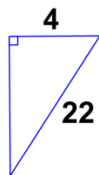
22.



23.



24.



25. What is the length of the hypotenuse if the legs of a right triangle are 15 m and 8.5 m?

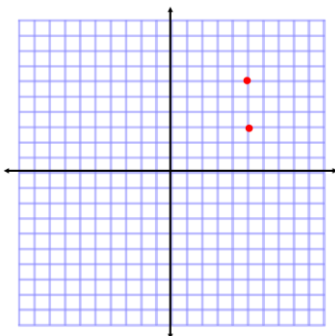
¹ From [EngageNY](https://www.engageny.org/)

26. The hypotenuse of a right triangle has a length of 10 and one leg has a length of 2.5. What is the length of the other leg?
27. The legs of a right triangle have lengths of 12 and 20. What is the length of the hypotenuse?
28. Name two more sets of Pythagorean Triplets.
29. Determine if each of the following sets of three numbers could be the sides to a right triangle.
 - a. 16,34,30
 - b. 2,4,5
 - c. 120, 95,80
 - d. 48,14,50
 - e. 300,500,400
30. A butterfly hatches and flies 2 miles due south, then it flies 1 mile due west. How far is it from where it hatched?
31. On a bike ride you start at your house and ride your bike 3.5 miles north and then 1.25 miles east. How far are you directly from your house?
32. A tent can be made by throwing a piece of cloth over tent poles making an isosceles triangle. How long would the cloth need to be so that the opening of the tent was 6 feet high and 4 feet wide?
33. A ladder is 15 feet long. If a window is 10 feet from the ground, how far out from the house will the ladder be if it is placed at the bottom of the window?
34. To walk around a pond you first walk 75 feet west and then walk 95 feet north. How many meters less would you have walked if you had walked through the pond?
35. Find the height of a pyramid whose slant height is 17 cm and base length is 16 cm.
36. Find the slant height of a pyramid whose base length is 10 m and height is 12 m.
37. Find the base length of a pyramid whose height is 21 in and slant height 29 in.
38. A 17 foot ladder is placed 10 feet from the wall. How high up the wall will the ladder reach?

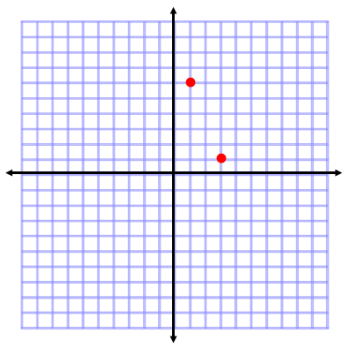
Distance
Classwork

What is the distance between the two graphed points?

39.



40.



Use the distance formula to find the distance between each pair of points.

- 41. $(20, -10)$, $(8, 6)$
- 42. $(-3, 17)$, $(15, -7)$
- 43. $(5, 1)$, $(5, -6)$
- 44. $(4, 6)$, $(-4, -3)$
- 45. $(6, -3)$, $(-5, -7)$

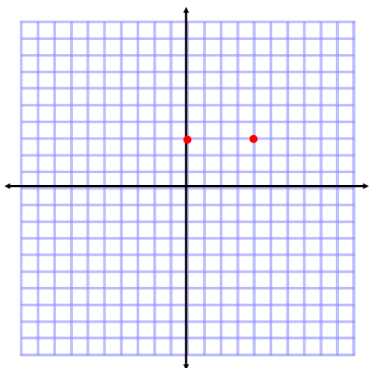
What is the perimeter of each polygon with the following points? (First plot points on a coordinate plane.)

- 46. $(2, 1)$ $(2, 3)$ $(5, 1)$ $(5, 3)$
- 47. $(3, -2)$ $(1, 1)$ $(-7, -2)$
- 48. $(1, 3)$ $(6, 1)$ $(3, -4)$ $(-3, -1)$
- 49. $(2, 10)$ $(-2, 6)$ $(2, 2)$ $(6, 6)$

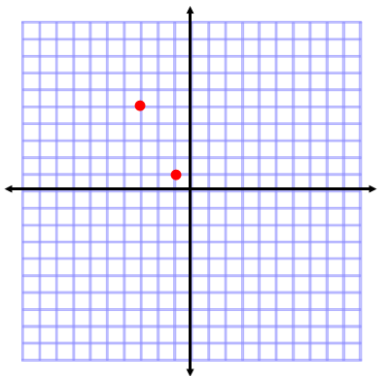
Homework

What is the distance between the two graphed points?

50.



51.



Use the distance formula to find the distance between each pair of points.

- 52. $(6,2)$, $(0,-6)$
- 53. $(-3,-1)$, $(-4,0)$
- 54. $(-2,3)$, $(-1,7)$
- 55. $(-7,-3)$, $(2,8)$
- 56. $(6,-2)$, $(-8, 5)$

What is the perimeter of each polygon with the following points? (First plot points on a coordinate plane.)

- 57. $(-3,7)$ $(2,7)$ $(2,3)$ $(-3,3)$
- 58. $(-2,3)$ $(4,1)$ $(0,-2)$ $(-6,-4)$
- 59. $(0,8)$ $(-3,0)$ $(2,-3)$
- 60. $(4,20)$ $(12,12)$ $(4,4)$ $(-4,12)$

Midpoints **Classwork**

Find the midpoint of the line segment with the given endpoints.

- 61. $(8,-9)$, $(0,5)$
- 62. $(5,9)$, $(-1,9)$
- 63. $(-7,8)$, $(-2,-9)$
- 64. $(7,4)$, $(9,-1)$
- 65. $(2,11)$, $(-9,0)$

Find the center of the circle with a diameter having the following sets of endpoints.

- 66. $(3,1)$ and $(-4,-2)$
- 67. $(4,5)$ and $(-6,13)$
- 68. $(-2,-4)$ and $(7,-10)$
- 69. $(6,7)$ and $(1,-3)$
- 70. $(4,-5)$ and $(9, -3)$

If point M is the midpoint between points P and Q, find the coordinates of the missing point.

- 71. M (5,-2) P (4,-3) Q ?
- 72. M (-4,3) P (5,9) Q ?
- 73. M (6,10) Q (-4,-3) P ?
- 74. M (12,4) Q (4,0) P ?
- 75. M (-9,-3) P (-12,-1) Q ?

Homework

Find the midpoint of the line segment with the given endpoints.

- 76. (4,-1), (2,-7)
- 77. (5,5), (9,-9)
- 78. (7,0), (-3, 9)
- 79. (-1,5), (6,-7)
- 80. (15,20), (-5,-15)

Find the center of the circle with a diameter having the following sets of endpoints.

- 81. (9,8) and (-6,4)
- 82. (-3,0) and (-7,6)
- 83. (4,-3) and (-4,3)
- 84. (-3,-7) and (-4,-5)
- 85. (6,-3) and (9,-7)

If point M is the midpoint between points P and Q, find the coordinates of the missing point.

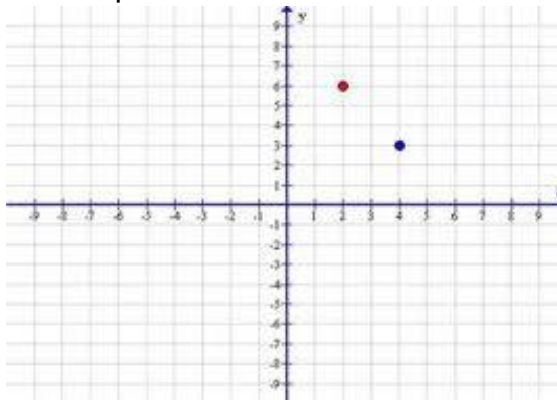
- 86. M (7,2) Q (12,4) P ?
- 87. M (-6,-10) Q (4,0) P ?
- 88. M (5,11) P (-8,2) Q ?
- 89. M (-7,-7) Q (3,10) P ?
- 90. M (-12,3) P (-15,-9) Q ?

Unit Review

Pythagorean Theorem, Distance, and Midpoint
Multiple Choice Questions

1. What is the distance between the two points?

- a. 3.61
- b. 3.92
- c. 13
- d. 5.7



2. What is the distance between (4,6) and (9, 15)?

- a. 106
- b. 10.3
- c. 10.2
- d. 34

3. What is the distance between (1,9) and (1, -4)?

- a. 11
- b. 15
- c. 12
- d. 13

4. What is the midpoint between (-3, -2) and (4,7)?

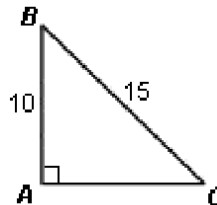
- a. (2.5, 0.5)
- b. (3.5, 4.5)
- c. (-7, -9)
- d. (0.5, 2.5)

5. What is the midpoint between (-4,-5) and (6,2)?

- a. (1, -1.5)
- b. (-1.5, 1)
- c. (-5, 3.5)
- d. (3.5, -5)

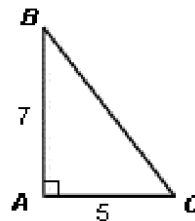
6. What is the length of the third side?

- a. 125
- b. 10
- c. 11.2
- d. 62.5



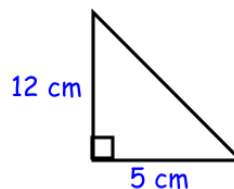
7. What is the length of the third side?

- a. 74
- b. 12
- c. 8.6
- d. 8.7



8. What is the length of the third side?

- a. 13
- b. 17
- c. 7
- d. 169



9. The legs of a right triangle are 6.0 and 5.5, what is the length of the hypotenuse?
- a. 10
 - b. 66.25
 - c. 11.5
 - d. 8.1
10. What is the center of the circle with a diameter having endpoints of (-3,2) and (4,2)?
- a. (-3.5, 0)
 - b. (0.5, 2)
 - c. (2, 0.5)
 - d. (1.5, 2.5)
11. What is one end point on a circle that has a midpoint of (6,7) and another endpoint on (0,0)?
- a. (12,14)
 - b. (6,7)
 - c. (3, 3.5)
 - d. (0,0)
12. If point S (4,2) is the midpoint between points R and T, what is point R if the coordinates of T are (9,17)?
- a. (-13, -1)
 - b. (-1, -13)
 - c. (4, 2)
 - d. (8, 4)
13. Which of the following sets of side lengths would not create a right triangle that would be considered a Pythagorean triple?
- a. 2 - 3 - 4
 - b. 3 - 4 - 5
 - c. 8 - 15 - 17
 - d. 5 - 12 - 13
14. Which of the following three sets of numbers would be side lengths you could use to make a right triangle?
- a. 2 - 3 - 4
 - b. 1 - 2 - 3
 - c. 6 - 7 - 9.2
 - d. 4.3 - 8 - 9

15. An airplane wants to fly across the Atlantic Ocean, which is 2,800km wide. However, as the plane flies, the wind carries it downwind and it ends up 300 km from where it wanted to be. How far did the airplane actually fly?
- a. 3500 km
 - b. 2816 km
 - c. 300 km
 - d. 2800 km

Pythagorean Theorem, Distance, and Midpoint
Short Constructed Response Questions

16. A designer wants to create an apartment in the shape of a right triangle as his new design. If he has three wall partitions that are 14 feet, 9 feet, and 20 feet, can he do it?
17. A couple wants a right triangle shaped pool in their back yard. If they can buy pool walls that are 3 feet, 5 feet, and 7 feet, can they build it?
18. Explain how to find the height of a pyramid given the slant height and the width of the base. Provide an example.
19. Find the perimeter of the parallelogram with one side length of 15 and the height of 4. Round your answer to the nearest tenth.
20. Find the perimeter of the right triangle with one side 4 and the hypotenuse of 7. Round your answer to the nearest tenth.
21. Find the perimeter of the square with one side 5. Round your answer to the nearest tenth.
22. Find two end points of a circle whose midpoint is (2,4) and an end point of (0, 14).
23. Draw a right triangle and label the sides with lengths that would be true. Show why.
24. Draw a right triangle and label the sides with lengths that would not be true. Show why.
25. If Nina started at her house (4,5) and walked to the grocery store (7,-4), how far (how many feet) did she walk?

Pythagorean Theorem, Distance, and Midpoint
Extended Constructed Response Questions

26. A car drives 15 miles due south, then drives 27 miles due east.
- Draw a diagram to represent the situation.
 - How many miles total did the car drive?
 - When the car returns to its starting point, it travels in a diagonal from the ending point to the starting point. Did the car drive more miles on the way to its destination or on the way back? By how much?
27. You want to create a garden in the shape of a parallelogram in your backyard.
- Draw your garden labeling the points.
 - What is the perimeter of your garden?
 - Where is the center of your garden? Label it on your graph.
28. Explain in your own words why the Pythagorean theorem works.

Answer Key

Chapter Questions

1. When a triangle has a right angle and squares are made on each of the three sides then the biggest square has the exact same area as the other two squares put together.
2. right
3. straight

Classwork/Homework

1. 13.9
2. 8.5
3. 14.5
4. 22.2
5. 12.5
6. 8.3
7. 14.6
8. 10.5
9. Multiple Answers ex: 3-4-5, 5-12-13
10.
 - a. no
 - b. yes
 - c. no
 - d. yes
 - e. yes
11. 17.5 mi.
12. 26.0 cm
13. 11.2 ft.
14. 21.6 in.
15. 20.5 mi.
16. 10 cm
17. 25 m
18. 30 in
19. 16 ft
20. 6.3
21. 14.9
22. 21.1
23. 17.7
24. 21.6
25. 17.2
26. 9.7
27. 23.3
28. Multiple Answers ex: 6-8-10, 9-12-20
29.
 - a. yes
 - b. no
 - c. no
 - d. yes
 - e. yes
30. 2.2 mi.
31. 3.7 mi.

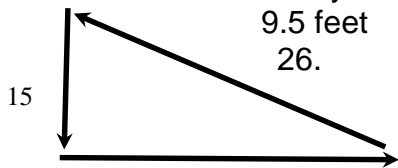
32. 12.6 ft.
33. 11.2 ft.
34. 121 ft.
35. 15 cm
36. 13 m
37. 40 in
38. 13.5 ft.
39. 3
40. $\sqrt{29}$
41. 20
42. 30
43. 7
44. $\sqrt{145}$
45. $\sqrt{137}$
46. 10
47. 22.1
48. 23.6
49. 22.6
50. 4
51. $\sqrt{20}$
52. 10
53. $\sqrt{2}$
54. $\sqrt{17}$
55. $\sqrt{202}$
56. $\sqrt{245} = 7\sqrt{5}$
57. 18
58. 21.7
59. 25.6
60. $4\sqrt{128} = 32\sqrt{2}$
61. (4, -2)
62. (2, 9)
63. (-4.5, -5)
64. (8, 1.5)
65. (-7/2, 11/2)
66. (-5, -5)
67. (-1, 9)
68. (5/2, -7)
69. (7/2, 2)
70. (13/2, -4)
71. (6, -3)
72. (-13, -3)
73. (16, 23)
74. (20, 8)
75. (-6, -5)
76. (3, -4)
77. (7, -2)
78. (2, 4.5)
79. (5/2, -1)
80. (5, 5/2)

- 81. $(\frac{3}{2}, 6)$
- 82. $(-5, 3)$
- 83. $(0, 0)$
- 84. $(-\frac{7}{2}, -6)$
- 85. $(\frac{15}{2}, -5)$

- 86. $(2, 0)$
- 87. $(-16, -20)$
- 88. $(18, 20)$
- 89. $(-17, -24)$
- 90. $(-9, 15)$

Unit Review Answers

- 1. a.
- 2. b.
- 3. d.
- 4. d.
- 5. a.
- 6. c.
- 7. c.
- 8. a.
- 9. d.
- 10. b.
- 11. a.
- 12. b.
- 13. a.
- 14. c.
- 15. b.
- 16. not possible
- 17. not possible
- 18. answers will vary
- 19. 38
- 20. 16.7
- 21. 20
- 22. $(4, -6)$
- 23. answers will vary
- 24. answers will vary
- 25.



27

- 42 miles
- More miles on the way. By 11.11 more miles.

- 27. answers will vary
- 28. answers will vary