

Chapter 1.6 Check Your Understanding

Exercises 1–6 True or False. Give reasons.

1. The three line segments joining the midpoints of the sides of an equilateral triangle form an equilateral triangle.

Answer:

True; each side is one-half the length of the original side.

2. When 31^{64} is expanded and written in usual base 10 form, the units digit is 4.

Answer:

False; the units digit for any power of 31 is 1.

3. The isosceles triangle having sides of lengths 6, 6, and 4 has an altitude (drawn to the short side) of length $4\sqrt{2}$.

Answer:

True; draw a diagram and use the Pythagorean Theorem.

4. The area of the triangle described in Exercise 3 is equal to $16\sqrt{2}$.

Answer:

False; area = $(4)(4\sqrt{2})/2 = 8\sqrt{2}$.

5. Points $(-2, 3)$ and $(4, 1)$ lie on a circle whose center is at $(-1, -4)$.

Answer:

True; for $A(-2, 3)$, $B(4, 1)$, and $C(-1, -4)$, $d(A, C) = 5\sqrt{2}$ and $d(B, C) = 5\sqrt{2}$.

6. When x is replaced by $\frac{-2}{3}$ in the open sentence $|3x + 1| - 2x = 1$, the resulting statement is true.

Answer:

False; substitute $-2/3$ for x and get $|-2 + 1| + 4/3 = 7/3$.

Exercises 7–10 Complete the sentence by entering “less than,” “greater than,” or “equal to” in the blank so that the resulting statement is true.

7. The area of a square having sides of length k is _____ the area of a circle with diameter of length k .

Answer:

The choice is greater than. $A_s = k^2$, $A_c = \pi(k/2)^2 = (\pi/4)k^2 < k^2$. Hence $A_c < A_s$.

8. The time it takes to walk 2 miles at a rate of 4 mph is _____ the time it takes to walk 3 miles at a rate of 5 mph.

Answer:

Use distance = rate \times time ($d = rt$) or $t = d/r$. For $d = 2$, $r = 4$, $t = 2/4 = 1/2$ hour. For $d = 3$, $r = 5$, $t = 3/5 = 0.6$ hour. The answer is "less than".

9. The distance from point $A(-1, -4)$ to point $B(-2, 3)$ is _____ the distance from A to point $C(4, 1)$.

Answer:

The choice is equal to. $d(A, B) = 5\sqrt{2}$, $d(A, C) = 5\sqrt{2}$.

10. If the sum of two numbers is 5 and their product is 3, then the sum of their squares is _____ 19.
(Hint: Use $(x + y)^2 = x^2 + 2xy + y^2$.)

Answer:

If $x + y = 5$ and $xy = 3$, then substitute into the equation in the hint, $5^2 = x^2 + 2(3) + y^2$ or $x^2 + y^2 = 19$. The answer is "equal to".