SAT Question

If the function f is defined by $f(x) = 2x + 3$, and if $f(a) = 11$, what is the value of a?

$f(x) = 2x + 3$

$11 = 2(x) + 3$

$8 = 2x$

$x = 4$

Scientific Notation

1. Write each number in the form $a \times 10^k$ where $1 \le a < 10$ and $k \in Z$.
How many significant figures does each number have?

a) 43.5 4.35×10^1

b) 5673.7 5.6737×10^3

c) 1200. 1.2×10^3

d) 4.001 4.001×10^0

e) 0.00452 4.52×10^{-3}

f) 0.00340

g) 784000

h) 0.450

i) 4503450

j) 0.000682

k) 67.4500

l) 0.56204

What are significant figures??

http://www.chem.sc.edu/faculty/morgan/resources/sigfigs/sigfigs2.html

Significant Figures Practice

http://science.widener.edu/svb/tutorial/sigfigures.html

EXAMPLES:

Example	Number of Significant Figures	Scientific Notation	
0.00682	3	6.82×10^{-3}	Leading zeros are not significant.
1.072	4	$1.072 (\times 10^{0})$	Imbedded zeros are always significant.
300	1	3×10^{2}	Trailing zeros are significant only if the decimal point is specified.
300.	3	3.00×10^{2}	
300.0	4	3.000×10^{2}	

Significant Figures

2. Round the following values to the requested number of significant figures or decimal places:

a) 2.526 [2 sf] 2.5

b) 24650 [1 sf] 20000

c) 0.347 [2 sf] 0.35

d) 45627 [4 sf] 45630

e) 0.4523 [2 sf] 0.45

f) ~~3.684~~ [1 dp]

g) ~~5.6720~~ [2 dp]

h) 0.04537 [3 sf] 0.0454

i) ~~0.04537~~ [3 dp]

j) 3456.20 [3 sf] 3460

k) 0.0453 [2 sf] 0.045

l) 89000 [1 sf] 9 x 10 = 90,000

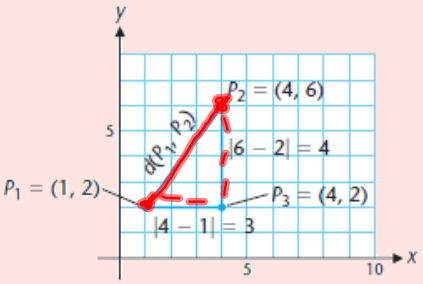
2.2 Distance in the Plane

Distance Between Two Points

Example 1

Find the distance between the points $P_1 = (1, 2)$ and $P_2 = (4, 6)$.

SOLUTION Connecting the points P_1, P_2, and $P_3 = (4, 2)$ with straight line segments forms a right triangle (Fig. 1).



› Figure 1

From the figure, we see that the lengths of the legs of the triangle are

$$d(P_1, P_3) = |4 - 1| = 3$$

and

$$d(P_3, P_2) = |6 - 2| = 4$$

The length of the hypotenuse is $d(P_1, P_2)$, the distance we are seeking. Applying the Pythagorean theorem (see Appendix B), we get

$$\begin{aligned}[d(P_1, P_2)]^2 &= [d(P_1, P_3)]^2 + [d(P_3, P_2)]^2 \\ &= 3^2 + 4^2 \\ &= 9 + 16 \\ &= 25\end{aligned}$$

Therefore, $d(P_1, P_2) = \sqrt{25} = 5$

Example 2

Using the Distance Formula

Find the distance between the points $(-3, 5)$ and $(-2, -8)$.*

THEOREM 1 Distance Formula

The distance between $P_1 = (x_1, y_1)$ and $P_2 = (x_2, y_2)$ is

$$d(P_1, P_2) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

SOLUTION Let $(x_1, y_1) = (-3, 5)$ and $(x_2, y_2) = (-2, -8)$. Then,

$$d = \sqrt{[(-2) - (-3)]^2 + [(-8) - 5]^2}$$
$$= \sqrt{(-2 + 3)^2 + (-8 - 5)^2} = \sqrt{1^2 + (-13)^2} = \sqrt{1 + 169} = \sqrt{170}$$

Notice that if we choose $(x_1, y_1) = (-2, -8)$ and $(x_2, y_2) = (-3, 5)$, then

$$d = \sqrt{[(-3) - (-2)]^2 + [5 - (-8)]^2} = \sqrt{1 + 169} = \sqrt{170}$$

so it doesn't matter which point we designate as P_1 or P_2.

THEOREM 2 Midpoint Formula

The midpoint of the line segment joining $P_1 = (x_1, y_1)$ and $P_2 = (x_2, y_2)$ is

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

The point M is the unique point satisfying

$$d(P_1, M) = d(M, P_2) = \frac{1}{2}d(P_1, P_2)$$

Example 3 **Using the Midpoint Formula**

Find the midpoint M of the line segment joining $A = (-3, 2)$ and $B = (4, -5)$. Plot A, B, and M and verify that $d(A, M) = d(M, B) = \frac{1}{2}d(A, B)$.

SOLUTION We use the midpoint formula with $(x_1, y_1) = (-3, 2)$ and $(x_2, y_2) = (4, -5)$ to obtain the coordinates of the midpoint M.

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$ Substitute $x_1 = -3$, $y_1 = 2$, $x_2 = 4$, and $y_2 = -5$.

$$= \left(\frac{-3 + 4}{2}, \frac{2 + (-5)}{2}\right)$$ Simplify.

$$= \left(\frac{1}{2}, \frac{-3}{2}\right)$$

$$= (0.5, -1.5)$$

Example 4 **Using the Midpoint Formula**

If $M = (1, 1)$ is the midpoint of the line segment joining $A = (-3, -1)$ and $B = (x, y)$, find the coordinates of B.

SOLUTION From the midpoint formula, we have

$$M = (1, 1) = \left(\frac{-3 + x}{2}, \frac{-1 + y}{2}\right)$$

We equate the corresponding coordinates and solve the resulting equations for x and y:

$$2 \cdot 1 = \frac{-3 + x}{2} \cdot 2 \qquad 2 \cdot 1 = \frac{-1 + y}{2} \cdot 2$$

$$2 = -3 + x \qquad 2 = -1 + y$$

$$2 + 3 = -3 + x + 3 \qquad 2 + 1 = -1 + y + 1$$

$$5 = x \qquad 3 = y$$

Therefore, $B = (5, 3)$.

Homework Assignment:
Scientific Notation WS
Online Assignment 2-2