ACT Strategies

TI PROFESSIONAL DEVELOPMENT

Resource Overview

In this document, participants will have a reference for ACT strategies to use on the exam.

ACT Strategies

1. Usually, Figures are Drawn to Scale

2. Solve Problems Backwards!

3. Substitute Numbers

4. Don't Fall for the Halfway Answer!

5. Substitute Ordered Pairs

6. Graph on a Tough Problem

7. Draw the Graph Nice & Big!

8. Geometry – Draw the Figure

9. Geometry – Draw Auxiliary Lines

10. Geometry – Label Every Side and Angle You Can!

11. Pay Attention When a Word is CAPITALIZED or *Italicized*!

12. Glance at the Answers

13. If a Figure is Labeled With a "?"...Don't Read the Question!

14. Calculating Percentages

15. Pay Attention to Units!

ACT Math Instructions:

1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

Usually, Figures are Drawn to Scale

Hint: Draw in 90 degree angles by cutting a corner of the page off. This gives you a frame of reference.
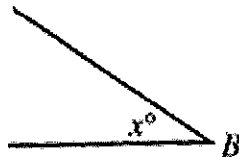
#37. Guess the angle =
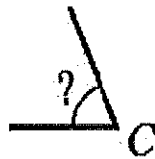
Now, eliminate the bad answers and guess again.
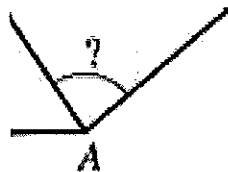
A. 42°
B. 46°
C. 60°
D. 63°
E. 69°

#3. Guess the angle =

Now, eliminate the bad answers and guess again.

A. 15
B. 25
C. 35
D. 65
E. 80

#7 Guess the angle =

Now, eliminate the bad answers and guess again.

A. 40°
B. 57°
C. 77°
D. 83°
E. 97°

#24 Guess the angle =

Now, eliminate the bad answers and guess again.
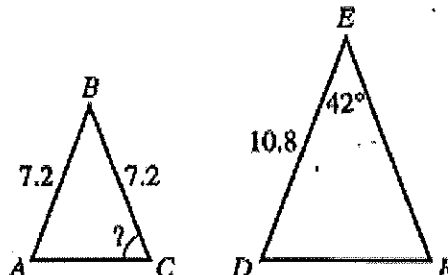
Main Street

F. 76°
G. 90°
H. 104°
J. 142°
K. 152°

Usually, Figures are Drawn to Scale

ACT April 2016

37. In the figure shown below, $\triangle ABC \sim \triangle DEF$, sides $\overline{AB}$ and $\overline{BC}$ are each 7.2 cm long, side $\overline{DE}$ is 10.8 cm long, and the measure of $\angle E$ is 42°. What is the measure of $\angle C$?

A. 42°
B. 46°
C. 60°
D. 63°
E. 69°

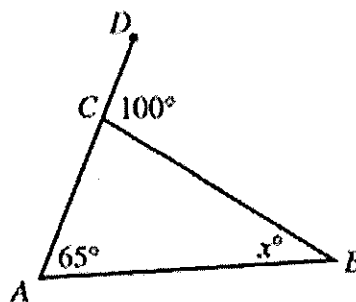**ACT December 2016**

3. In the figure below, C lies on $\overline{AD}$, the measure of $\angle BAC$ is 65°, the measure of $\angle BCD$ is 100°, and the measure of $\angle ABC$ is $x°$.
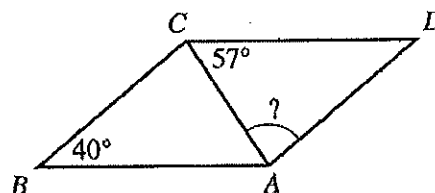
What is the value of x?

A. 15
B. 25
C. 35
D. 65
E. 80

ACT April 2017

7. In parallelogram $ABCD$ below, $\overline{AC}$ is a diagonal, the measure of $\angle ABC$ is 40°, and the measure of $\angle ACD$ is 57°. What is the measure of $\angle CAD$?

A. 40°
B. 57°
C. 77°
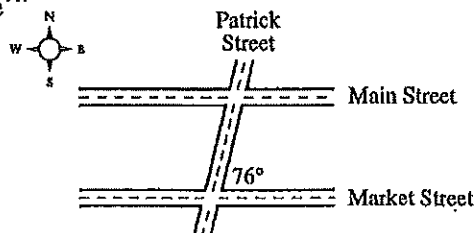D. 83°
E. 97°

ACT April 2016

24. In Middletown, Main Street and Market Street are parallel to each other. Patrick Street intersects Market Street to form a 76° angle at the northeast corner, as shown in the figure below. What is the measure of the angle formed at the southeast corner of Main Street and Patrick Street°

F. 76°
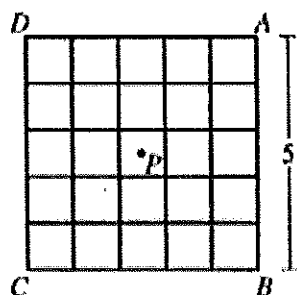G. 90°
H. 104°
J. 142°
K. 152°

Answers: 37E, 3C, 7D, 24H

Usually, Figures are Drawn to Scale

35. What is the length of $\overline{AC}$?

Now, eliminate the bad answers and guess again.

A. $2\sqrt{5}$

B. 5

C. $5\sqrt{2}$

D. 20

E. 25

6. Where would these graphs intersect?
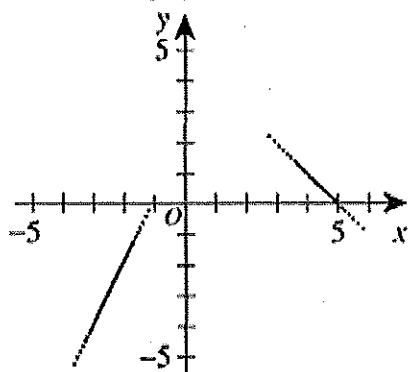
Now, eliminate the bad answers and guess again.

F. $(-1,5)$
G. $(\ 1,4)$
H. $(\ 2,5)$
J. $(\ 4,1)$

13. What is the length of $\overline{AC}$?

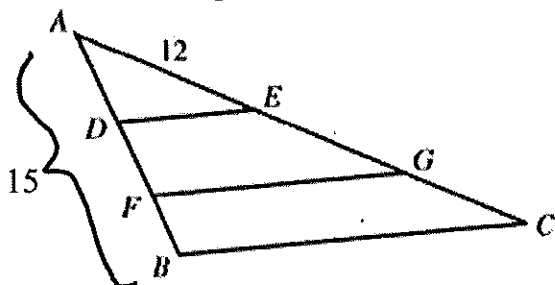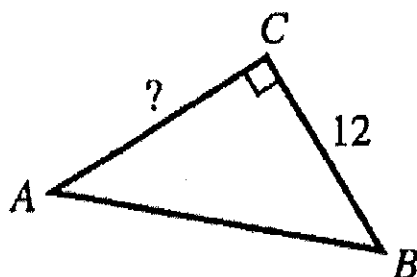Now, eliminate the bad answers and guess again.

A. 9
B. 18
C. 21
D. 30
E. 36

32. What is the length of $\overline{AC}$?

Now, eliminate the bad answers and guess again.

F. 2
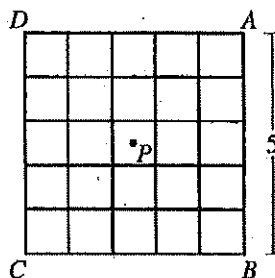
G. 4

H. $4\sqrt{7}$

J. 16

K. 20

Usually, Figures are Drawn to Scale

ACT June 2016

35. Square $ABCD$, shown below, has side length 5 meters. The square is divided into 25 nonoverlapping congruent squares. Point P is the center of $ABCD$.

What is the length, in meters, of $\overline{AC}$?

A. $2\sqrt{5}$
B. 5
C. $5\sqrt{2}$
D. 20
E. 25

ACT December 2016

6. Portions of the graphs represented by the functions $-2x + y = 2$ and $x + y = 5$ are shown in the standard (x,y) coordinate plane below. Although only a portion of each graph is shown, the domain of each function is all real numbers. If it can be determined, at what point do the graphs intersect?

F. $(-1,5)$
G. $(1,4)$
H. $(2,5)$
J. $(4,1)$
K. Cannot be determined from the given information
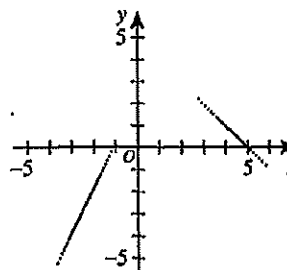
ACT June 2017

13. In the figure shown below, E and G lie on $\overline{AC}$, D and F lie on $\overline{AB}$, $\overline{DE}$ and $\overline{FG}$ are parallel to $\overline{BC}$, and the given lengths are in feet. What is the length of $\overline{AC}$, in feet?

A. 9
B. 18
C. 21
D. 30
E. 36
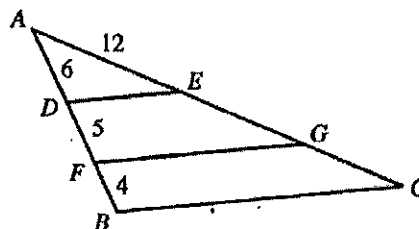
ACT April 2018

32. In the right triangle $\triangle ABC$ shown below, the length of $\overline{BC}$ is 12 feet and $\sin A = \frac{3}{4}$. What is the length, in feet, of $\overline{AC}$?

F. 2
G. 4
H. $4\sqrt{7}$
J. 16
K. 20

Answers: 35C, 6G, 13D, 32H

Usually, Figures are Drawn to Scale
ACT April 2016   Guess   Check it

What is the
distance from
A to B?

y

(0,3)

A

A. 2.4
B. 3
C. 4
D. 4.8
E. 6

B

(0,−3)
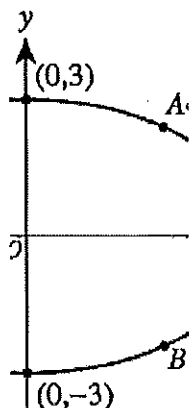
53. Graphed in the standard (x,y) coordinate plane below is an ellipse. The center of the ellipse is (0,0), and points (−5,0), (0,3), (5,0), (0,−3), $A(3,a)$, and $B(3,b)$ lie on the ellipse. What is the distance, in coordinate units, from A to B ?

y

(0,3)

$A(3,a)$

(−5,0)

(5,0)

O

x

$B(3,b)$

(0,−3)
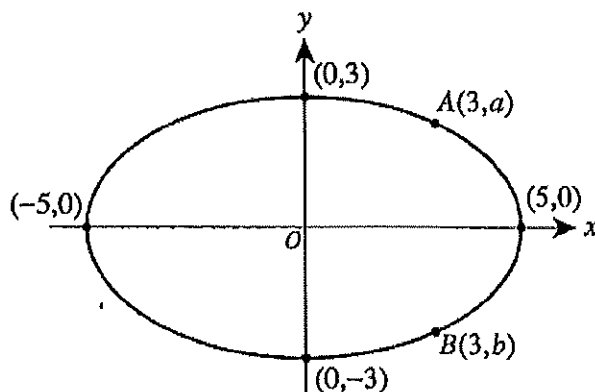
A. 2.4
B. 3
C. 4
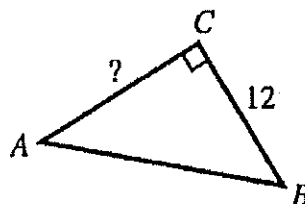**D.** 4.8
E. 6

ACT April 2016   Guess   Check it

What is the
y-intercept of the
middle graph?

(0,?)

O

(−4,0)
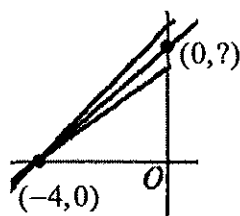
A. $\frac{5}{6}$
B. $\frac{8}{3}$
C. 3
D. $\frac{10}{3}$
E. 4

59. In the standard (x,y) coordinate plane below, lines q, r, and s all have an x-intercept of −4. The slope of line q is 1, the slope of line r is $\frac{2}{3}$, and the slope of line s is the average of the slopes of lines q and r. What is the y-intercept of line s ?
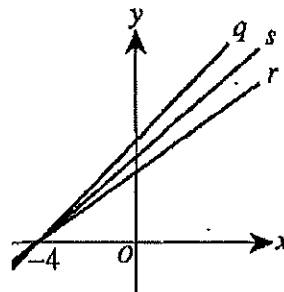
A. $\frac{5}{6}$

B. $\frac{8}{3}$

C. 3

D. $\frac{10}{3}$

E. 4

y

q s

r

−4

O

x

Answers: 53D, 59D

Solve Problems Backwards

Hint: If the question is not asking for the least or greatest, then start substituting in the middle answer. Hopefully, if the middle answer is not correct, you will be able to eliminate two other answers. Try to *avoid* substituting in all 5 answer choices!

ACT June 2017

15. The ratio of Jane's age to her daughter's age is 9:2. The sum of their ages is 44. How old is Jane?

A. 22
B. 33
C. 35
D. 36
E. 40

Substitute the middle answer first!

$jane = 35$, which means $daughter = 9$

Does $\dfrac{35}{9} = \dfrac{9}{2}$?

The ratio of Jane's age to her daughter is not large enough. Answer choices A & B can be eliminated.

$jane = 36$, which means $daughter = 8$

Does $\dfrac{36}{8} = \dfrac{9}{2}$?

YES!

ACT April 2016

29. What positive number when divided by its reciprocal has a result of $\dfrac{4}{25}$?

A. $\dfrac{2}{5}$

B. $\dfrac{2}{25}$

C. $\dfrac{5}{2}$

D. $\dfrac{8}{25}$

E. $\dfrac{25}{8}$

Hint: Use the fraction template.

ACT April 2016

34. A family will rent a picnic shelter for $200 for a reunion. The cost of the shelter will be distributed equally among the people who plan to attend. The current cost per person will decrease by $1 if 10 more people plan to attend the reunion. How many people are currently planning to attend the reunion?

F. 10
G. 20
H. 40
J. 50
K. 63

Can you set up an equation to solve this?

$40x - 40$

Answers: 15D, 29A, 34H

Solve Problems Backwards

ACT December 2016

11. Ben is saving money to buy a TV that costs $495, including tax. Ben opens a savings account with a deposit of $75 and deposits $65 at the end of each month. What is the minimum number of months Ben will need to make deposits until he has enough money in his account to buy the TV ?

   A. 5
   B. 6
   C. 7
   D. 8
   E. 9

What answer should you substitute first?

ACT June 2017

34. A school admissions office accepts 2 out of every 7 applicants. Given that the school accepted 630 students, how many applicants were NOT accepted?

   F. 140
   G. 180
   H. 490
   J. 1,260
   K. 1,575

Pay attention to words that are capitalized!

ACT December 2016

8. The cost of a long-distance call to a certain city is $1.05 for the first minute and $0.15 for each additional minute or part thereof. What is the cost of a 15-minute call to this city?

   F. $1.20
   G. $2.25
   H. $3.15
   J. $3.30
   K. $3.45

What answer is a big distractor here?

ACT April 2017

12. In Cherokee County, the fine for speeding is $17 for each mile per hour the driver is traveling over the posted speed limit. In Cherokee County, Kirk was fined $221 for speeding on a road with a posted speed limit of 30 mph. Kirk was fined for traveling at what speed, in miles per hour?

   F. 13
   G. 17
   H. 43
   J. 47
   K. 60

What are the bad answers here?

Answers: 11C, 34K, 8H, 12H

Substitute Numbers

Use this strategy when both the questions and answers have variables. In general, stay away from choosing values like 0 or 1 since those numbers have unique properties. Once you substitute a number and evaluate the question, set all of the answer choices equal to that value. Cross out the incorrect answers as you substitute numbers to each answer choice. It is usually a good idea to test all 5 answer choices when using this strategy.

ACT April 2017

16. Which of the following expressions is equivalent to $x^{\frac{2}{3}}$?

F. $\frac{x^2}{3}$ $\neq 1.587$

G. $\frac{x(2)}{3}$ $\neq 1.587$

H. $\sqrt{x^3}$ $\neq 1.587$

J. $\sqrt[3]{x}$ $\neq 1.587$

K. $\sqrt[3]{x^2}$ $= 1.587$

First, choose a value for the variable, x.
$x = 2$, then substitute (with parentheses)!

NORMAL FLOAT AUTO REAL RADIAN MP

$(2)^{\frac{2}{3}}$
............1.587401052.

Now, substitute $x = 2$ for all five answer choices.

Cross out the incorrect answer choices.

NORMAL FLOAT AUTO REAL RADIAN MP

$\frac{(2)^2}{3.}$
............1.333333333.
$\frac{(2)(2)}{3.}$
............1.333333333.
$\sqrt{(2.)^3}$
............2.828427125.

NORMAL FLOAT AUTO REAL RADIAN MP

$\sqrt[3]{(2.)}$
............1.25992105.
$\sqrt[3]{(2.)^2}$
............1.587401052.

ACT April 2016

Hint: Make sure the numbers you pick make the equation true.

40. Each student's project in a history seminar is given a point score by the teacher and by each of the other students in the seminar. A student's project grade, g, is determined by the formula $g = \frac{3t+s}{3+n}$, where t is the score the teacher gives, s is the sum of the scores the students give, and n is the number of students in the seminar. What is t in terms of g, s, and n ?

F. $t = g - n - s$

G. $t = gn + g - s$

H. $t = \frac{3gn - s}{9}$

J. $t = \frac{gn - s}{3}$

K. $t = \frac{3g + gn - s}{3}$
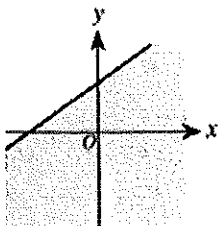
Answers: 16K, 40K

Substitute Numbers

ACT June 2017

How do you check your answers on this problem?

56. Each of the following graphs in the standard (x,y) coordinate plane has the same scale on both axes. One graph is the graph of $ax + by \leq c$, where $0 < a < b < c$. Which one is it?

F.

J.
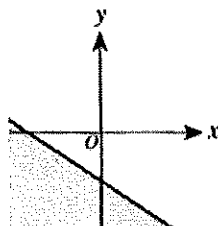
G.
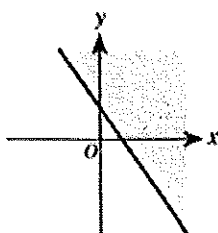
K.
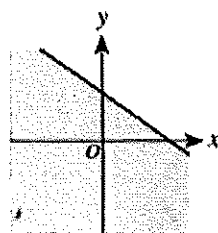
H.
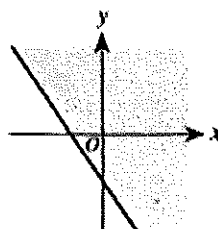
ACT December 2016

Is this a good business model?

37. Suzanne and Chad are going to bake and deliver cookies to college students during final exam week. They estimate it will cost $4 for the ingredients to make each batch of cookies and $50 to buy the mixer, bowls, and other utensils they will need. They decide to sell the cookies for $5 per batch. Assume they have no other expenses. Which of the following equations represents the profit, P dollars, they will make on b batches of cookies?

A. $P = 49b$
B. $P = 54b - 5$
C. $P = 55b - 4$
D. $P = -b + 50$
E. $P = b - 50$

Answers: 56K, 37E

Substitute Numbers

ACT June 2016   What are the bad answers here?

4. $3x^9 \cdot 5x^9$ is equivalent to:

   F. $8x^{18}$

   G. $8x^{81}$

   H. $15x^9$

   J. $15x^{18}$

   K. $15x^{81}$

ACT December 2016   Hint: Substitute numbers so that x is an integer!

24. Given $x = \dfrac{4a + b}{3}$, which of the following expressions is equivalent to b ?

   F. $3x - 4a$

   G. $3x + 4a$

   H. $x - \dfrac{4a}{3}$

   J. $\dfrac{x}{3} - 4a$

   K. $\dfrac{x - 4a}{3}$

ACT June 2017   Hint: What is the best value to choose for x?

37. For all real numbers x such that $x \neq 0$, $\dfrac{4}{5} + \dfrac{7}{x} = ?$

   A. $\dfrac{11}{5x}$

   B. $\dfrac{28}{5x}$

   C. $\dfrac{11}{5 + x}$

   D. $\dfrac{7x + 20}{5 + x}$

   E. $\dfrac{4x + 35}{5x}$

Answers: 4J, 24F, 37E

Substitute Numbers

ACT April 2016   Which answer is a big distractor here?

51. The volume of a right circular cone with radius r and
height h is $\frac{1}{3}\pi r^2 h$, where r and h have the same unit of
measure. Cones A and B are both right circular cones.
The radius of Cone B is 2 times the radius of Cone A.
Cone B's height is $\frac{1}{2}$ Cone A's height. Compared to
the volume of Cone A, the volume of Cone B is:

A. the same.

B. $\frac{1}{2}$ as great.

C. $\frac{2}{3}$ as great.

D. 2 times as great.

E. 4 times as great.

ACT April 2016   Which exponent rule is being tested?

58. If x and a are positive rational numbers such that
$x^{2a} = 3$, then $x^{6a} = ?$

F. 6
G. 9
H. 12
J. 18
K. 27

Answers: 51D, 58K

Don't Fall for the Halfway Answer!
This is a math tragedy! Sometimes students do the math correctly. But, their answer is not what the question asked for! Always reread the last line and be sure and answer the question that was asked!

ACT April 2017

19. The lengths of the 2 legs of right triangle $\triangle ABC$ shown below are given in inches. The midpoint of $\overline{AB}$ is how many inches from A ?

A. 16
B. 20
C. 21
D. 28
E. 40
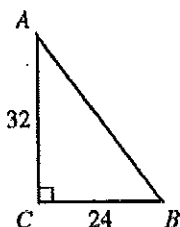
Use the Pythagorean Theorem to find the missing side length, c.

```
NORMAL FLOAT AUTO REAL RADIAN MP      0
32²+24²
                              1600
√1600
                                40
```

Answer choice E is the halfway answer. Read the question again and see that they are asking for the midpoint!

Which answer is the halfway answer?

ACT April 2017

43. Mario plays basketball on a town league team. The table below gives Mario's scoring statistics for last season. How many points did Mario score playing basketball last season?

Type of shot	Number attempted	Percent successful
1-point free throw	80	75%
2-point field goal	60	90%
3-point field goal	60	25%

A. 129
B. 190
C. 213
D. 330
E. 380

ACT April 2017

Which answer is the halfway answer?

60. Ray $\overrightarrow{PK}$ bisects $\angle LPM$, the measure of $\angle LPM$ is $11x°$, and the measure of $\angle LPK$ is $(4x + 18)°$. What is the measure of $\angle KPM$?

F. 12°

G. $28\frac{2}{7}°$

H. 42°

J. $61\frac{1}{5}°$
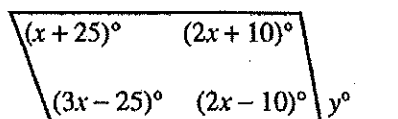
K. 66°

Answers: 19B, 43C, 60K

Don't Fall for the Halfway Answer!

ACT June 2016

9. The combined length of 3 pieces of a board is 60 inches. The lengths of the pieces are in the ratio 3:5:7. What is the length, in inches, of the longest piece?

   A. 4
   B. 12
   C. 15
   D. 20
   E. 28

Which answer is the halfway answer?

ACT June 2016

22. In the figure below, 5 angle measures are given. The angle marked with a measure of $y°$ is an exterior angle. What is the value of y ?

   F. 22.5
   G. 45
   H. 80
   J. 100
   K. 145

Which answer is the halfway answer?

ACT April 2017

Mikea, an intern with the Parks and Recreation Department, is developing a proposal for the new trapezoidal Springdale Park. The figure below shows her scale drawing of the proposed park with 3 side lengths and the radius of the merry-go-round given in inches. In Mikea's scale drawing, 1 inch represents 1.5 feet.

Which answer is the halfway answer?
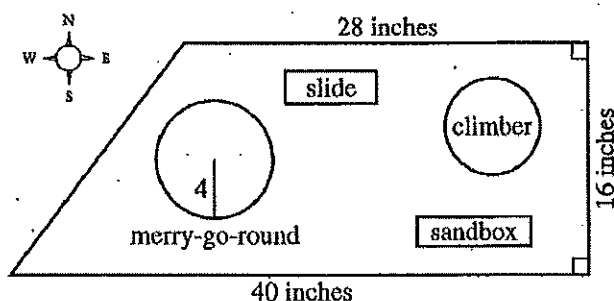
33. Mikea's proposal includes installing a fence on the perimeter of the park. What is the perimeter, in *feet*, of the park?

   A. 84
   B. 88
   C. 104
   D. 126
   E. 156

Answers: 9E, 22J, 33E

Use Substitution with Ordered Pairs

Every time you see an ordered pair: Write (x, y) below the ordered pair. Then, substitute the x- and y-values into the equation.

ACT December 2016   Using the ordered pair $(-5,6)$, substitute $x = -5$ and $y = 6$.

21. In the standard (x,y) coordinate plane, the graph of the line $3x - 4y = d$ passes through the point $(-5,6)$. What is the value of d ?

A. -39
B. -9
C. 2
D. 9
E. 38

ACT June 2016   **45.** Consider the transformation of the standard (x,y) coordinate plane that maps each point (x,y) to the point (kx,ky) for a certain positive constant, k. In particular, this transformation maps $(3,9)$ to $(1,3)$. This transformation maps $(9,24)$ to which of the following points?

A. (3, 8)
B. (6,21)
C. (7,18)
D. (11,30)
E. (27,72)

ACT June 2017   **19.** Which of the following ordered pairs in the standard (x,y) coordinate plane satisfies the system of inequalities below?

$$x > 2$$
$$y > 0$$
$$x + y < 5$$

A. (1,3)
B. (2,2)
C. (3,1)
D. (3,2)
E. (4,0)

ACT June 2016   **17.** A function g is defined as $g(x,y,z) = 4xy - 3xz^2$. What is $g(2,4,-3)$?

A. -22
B. -4
C. 8
D. 68   **Answers: 21A, 45A, 19C, 17A**
E. 86

Use Substitution with Ordered Pairs

ACT December 2016

18. In the standard (x,y) coordinate plane, the line represented by which of the following equations goes through $(0,7)$ and is parallel to the line represented by $y = -2x - 4$?

F. $y = -2x - 7$

G. $y = -2x + 7$

H. $y = \frac{1}{2}x - 7$

J. $y = \frac{1}{2}x + 7$

K. $y = 7x - 4$

ACT December 2016

23. In the standard (x,y) coordinate plane, a translation maps a point (x,y) to its image $(x - 5, y + 3)$. To what image does this translation map $(-3,-2)$?

A. $(-8,-5)$
B. $(-8, 1)$
C. $(-2, 1)$
D. $(2,-5)$
E. $(2, 1)$

ACT June 2014

50. In the standard (x,y) coordinate plane, line a contains the points $(-4,2)$ and $(-1,-3)$, and line b contains the points $(3,0)$ and $(7,0)$. At what point does line a intersect line b ?

F. $\left(-\frac{14}{5}, 0\right)$

G. $\left(\frac{107}{35}, \frac{3}{7}\right)$

H. $\left(0,-\frac{14}{3}\right)$

J. $\left(3,-\frac{29}{3}\right)$

K. $\left(7,-\frac{49}{3}\right)$

ACT December 2016

23. In the standard (x,y) coordinate plane, a translation maps a point (x,y) to its image $(x - 5, y + 3)$. To what image does this translation map $(-3,-2)$?

A. $(-8,-5)$
B. $(-8, 1)$
C. $(-2, 1)$
D. $(2,-5)$
E. $(2, 1)$

Answers: 18G, 23B, 50F, 23B

Graph on a Tough Problem

If you are faced with a really tough problem, it can be helpful to look at the graph of the function.

ACT December 2016

54. Which of the following number line graphs represents all values in the domain of the function $y = \log_{10}(x^2 - 4x + 3)$?

ACT April 2016

41. For all $x \neq -2$, which of the following expressions is equal to $\dfrac{x^2 + 5x + 6}{x + 2} + x + 5$?

A. $x + 8$

B. $2x + 8$

C. $x^2 + 8x + 15$

D. $\dfrac{2x + 8}{x + 2}$

E. $\dfrac{x^2 + 6x + 11}{x + 2}$

ACT April 2018

28. Which of the following most precisely describes the roots of the equation $5x^2 + 7x + 2 = 0$?

F. 1 rational (double) root
G. 1 irrational (double) root
H. 2 rational roots
J. 2 irrational roots
K. 2 complex roots (with nonzero imaginary parts)

Answers: 54K, 41B, 28H

ACT April 2018   **46.** As x continually increases in value without bound, the value of $\dfrac{x}{x+3}$ most closely approaches:

F. 0

G. $\dfrac{1}{3}$

H. 1

J. 3

K. ∞

Answers: 46H

Draw the Figure

As a general rule of thumb, whenever a geometric figure is described but not drawn...draw it!

ACT April 2017

22. The length of a rectangle is 5 inches longer than the width. The perimeter of the rectangle is 40 inches. What is the width of the rectangle, in inches?

    F. 7.5
    G. 8
    H. 15
    J. 16
    K. 17.5

ACT December 2016

35. In $\triangle ABC$, $AB = 6$ cm, $AC = 12$ cm, $m\angle A = 60°$, and $\overline{AC}$ is the longest side. Which of the following statements about the measures of the angles in $\triangle ABC$ *must* be true?

(Note: $m\angle X$ denotes the measure of angle X.)

    A. $m\angle A = m\angle B = m\angle C$
    B. $m\angle B > m\angle A > m\angle C$
    C. $m\angle B = m\angle C > m\angle A$
    D. $m\angle B > m\angle C = m\angle A$
    E. $m\angle C > m\angle A > m\angle B$

ACT December 2016

2. The statement $\triangle ABC \cong \triangle DEF$ is true. Which of the following statements *must* be true?

    F. $\overline{AB} \cong \overline{DF}$
    G. $\overline{AC} \cong \overline{EF}$
    H. $\overline{BC} \cong \overline{DF}$
    J. $\angle A \cong \angle F$
    K. $\angle C \cong \angle F$

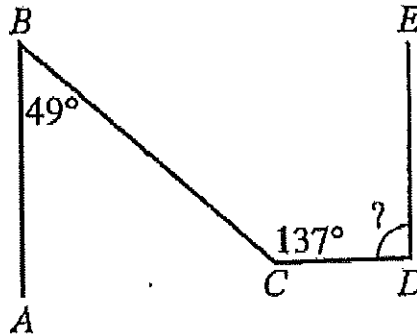**Answers: 22F, 35B, 2K**

Draw Auxiliary Lines

Sometimes it is necessary to break a figure up into smaller parts (triangles and squares) in order to solve the problem.

ACT April 2014

55. In the figure below, $\overline{AB}$ is parallel to $\overline{DE}$, the measure of $\angle ABC$ is 49°, and the measure of $\angle BCD$ is 137°. What is the measure of $\angle CDE$?
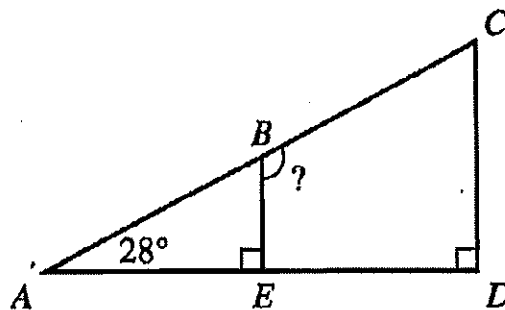
A. 78°
B. 88°
C. 90°
D. 92°
E. 96°

ACT June 2017

6. In $\triangle ACD$ below, B is on $\overline{AC}$, E is on $\overline{AD}$, the measure of $\angle CAD$ is 28°, and $\overline{AD}$ is perpendicular to both $\overline{BE}$ and $\overline{CD}$. What is the measure of $\angle CBE$?

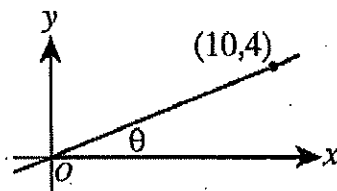F. 104°
G. 118°
H. 124°
J. 146°
K. 152°

Answers: 55D, 6G

ACT April 2017

39. A line through the origin and (10,4) is shown in the standard (x,y) coordinate plane below. The acute angle between the line and the positive x-axis has measure θ. What is the value of $\tan \theta$?

A. $\dfrac{\sqrt{29}}{2}$

B. $\dfrac{2}{\sqrt{29}}$

C. $\dfrac{5}{\sqrt{29}}$

D. $\dfrac{2}{5}$

E. $\dfrac{5}{2}$

ACT April 2017

49. The graph of a function $y = f(x)$ consists of 3 line segments. The graph and the coordinates of the endpoints of the 3 line segments are shown in the standard (x,y) coordinate plane below. What is the area, in square coordinate units, of the region bounded by the graph of $y = f(x)$, the positive y-axis, and the positive x-axis?
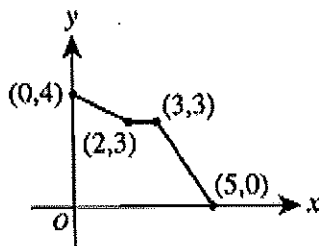
A. 10
B. 13
C. 14
D. 15
E. 20

Answers: 39D, 49B

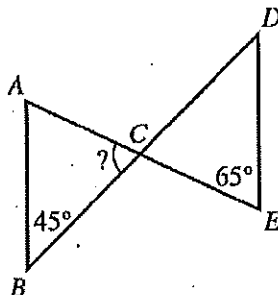**Label Every Side and Angle You Can!**
Write down every angle and side you can determine. Doing so will help you find the angle or side for which you are solving.
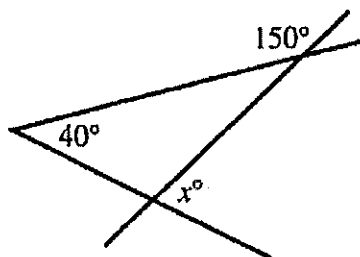
ACT June 2016 **6.** In the figure below, C lies on both $\overline{AE}$ and $\overline{BD}$, $\overline{AB}$ and $\overline{DE}$ are parallel and congruent, and 2 angle measures are given. What is the measure of $\angle ACB$?

F. 55°
G. 57.5°
H. 65°
J. 67.5°
K. 70°

ACT April 2018 **4.** Three line segments intersect as shown in the figure below, forming angles with measures of 150°, 40°, and $x°$, respectively. What is the value of x ?

F. 95
G. 85
H. 80
J. 75
K. 70

ACT April 2018 **20.** In the figure shown below, all angles are right angles, and the side lengths given are in feet. What is the area, in square feet, of the figure?

F. 49
G. 71
H. 86
J. 105
K. 120
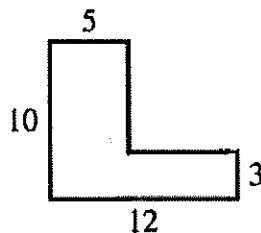
Answers: 6K, 4K, 20G

Pay Attention When a Word is CAPITALIZED or *Italicized*!
Anytime a word is capitalized or italicized an alert should go off in your head! It is important!

April 2018   **34.** A bag contains several marbles. On 3 successive draws with replacement, a red marble is drawn from the bag each time. Which of the following statements *must* be true about the marbles in the bag?

    F. At least 1 marble is red.
    G. Exactly 1 marble is red.
    H. Exactly 3 marbles are red.
    J. All the marbles are red.
    K. The bag contains more red marbles than marbles of other colors.

June 2018   **14.** The volume of a sphere is $\frac{4\pi r^3}{3}$, where r is the radius of the sphere. What is the volume, in cubic yards, of a sphere with a *diameter* of 4 yards?

    F. $\frac{32}{3}\pi$
    G. $\frac{64}{3}\pi$
    H. 32π
    J. 48π
    K. $\frac{256}{3}\pi$

June 2017   **28.** Jamie claims, "If a triangle is in Set A, then it is not isosceles." Later, Jamie discovers that $\triangle MNP$ is a counterexample proving this claim false. Which of the following statements *must* be true about $\triangle MNP$?

    F. It is isosceles and in Set A.
    G. It is scalene and in Set A.
    H. It is obtuse and not in Set A.
    J. It is scalene and not in Set A.
    K. It is isosceles and not in Set A.

June 2018   **56.** For all $x > 0$, which of the following expressions is NOT equivalent to $\sqrt{\sqrt[3]{x^2}}$?

    F. $\sqrt[3]{x}$
    G. $\sqrt[6]{x^2}$
    H. $\sqrt[3]{\sqrt{x^2}}$
    J. $x^{\frac{1}{3}}$
    K. $x^{\frac{2}{3}}$

Answers: 34F, 14F, 28F, 56G

Glance at the Answers

Glancing at the answers can help you craft a solution plan. Often, the answers are not in the form you might have expected!

ACT December 2016

53. The employees at a hotel reservation center assign an 8-digit confirmation number (CN) to each customer making a reservation. The first digit in each CN is 8. The other 7 digits can be any digit 0 through 9, and digits may repeat. How many possible 8-digit CNs are there?

   A. 8^7
   B. 9^7
   C. 10^7
   D. 8^8
   E. 10^8

ACT April 2017

46. A box in the shape of a cube has an interior side length of 18 inches and is used to ship a right circular cylinder with a radius of 6 inches and a height of 12 inches. The interior of the box not occupied by the cylinder is filled with packing material. Which of the following numerical expressions gives the number of cubic inches of the box filled with packing material?

   F. $6(18)^2 - 2\pi(6)(12) - 2\pi(6)^2$
   G. $6(18)^2 - 2\pi(6)(12)$
   H. $18^3 - \pi(6)(12)^2$
   J. $18^3 - \pi(6)^2(12)$
   K. $18^3 - \pi(12)^3$

ACT December 2016

15. In the figure below, all of the small squares are equal in area, and the area of rectangle $ABCD$ is 1 square unit. Which of the following expressions represents the area, in square units, of the shaded region?

   A. $\frac{1}{8} \cdot \frac{1}{6}$

   B. $\frac{1}{8} \cdot \frac{5}{6}$

   C. $\frac{1}{8} \cdot \frac{7}{8}$

   D. $\frac{7}{8} \cdot \frac{1}{6}$

   E. $\frac{7}{8} \cdot \frac{5}{6}$
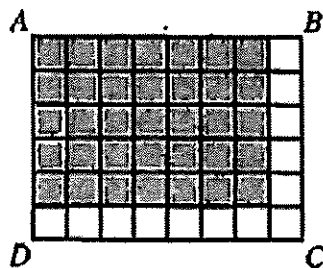
Answers: 53C, 46J, 15E

TI PROFESSIONAL DEVELOPMENT

Don't Read the Question if You See a "?" in the Figure
This strategy is a real time-saver! When a figure is labeled with a "?" for the missing side or angle, don't waste time reading the question. If you don't have enough information to solve the problem, then scan the question for any important extra information.

ACT June 2016 **34.** You're on a salvage ship in the Pacific Ocean when your ship's sonar locates a shipwreck at an angle of depression of 60°, as shown in the figure below. After your ship travels 500 meters on the surface of the water to be directly over the wreck, how many meters down would you have to dive to reach the wreck?
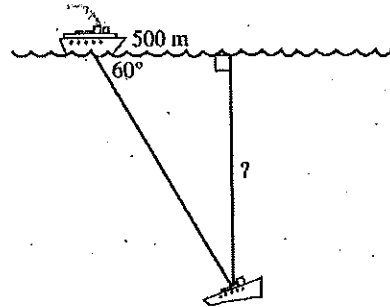
F. $\dfrac{500}{\sqrt{3}}$

G. 500

H. $1,000$

J. $500\sqrt{2}$

K. $500\sqrt{3}$

ACT April 2016 **30.** The base of an escalator in a store is 26 meters long and has a vertical lift of 10 meters as shown below. Which of the following expressions is closest to the angle of inclination between the base of the escalator and the horizontal floor?
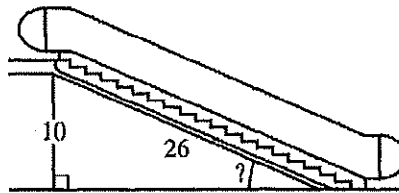
F. $\sin^{-1}\left(\dfrac{10}{26}\right)$

G. $\sin^{-1}\left(\dfrac{26}{10}\right)$

H. $\cos^{-1}\left(\dfrac{10}{26}\right)$

J. $\tan^{-1}\left(\dfrac{10}{26}\right)$

K. $\tan^{-1}\left(\dfrac{26}{10}\right)$

ACT June 2015 **16.** In the figure below, vertices D and F of $\triangle DEF$ lie on $\overleftrightarrow{CG}$, the measure of $\angle CDE$ is 148°, and the measure of $\angle EFG$ is 140°. What is the measure of $\angle DEF$?
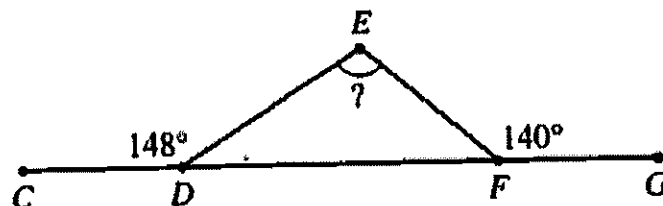
F. $72°$
G. $98°$
H. $100°$
J. $108°$
K. $116°$

Answers: 34K, 30F, 16J

Calculating Percentages

Use the fast method of calculating a percentage increase or decrease. If you are increasing by 20%, then multiply by 1.2. If you are decreasing by 20%, then multiply by 0.8.

ACT June 2016

2. A motel manager's costs are 24% higher this year than they had been when the room rate was $60.00. If the room rate had increased by the same percent as the manager's costs, what would the room rate be this year?

   F. $68.40
   G. $70.00
   H. $72.00
   J. $74.40
   K. $78.95

ACT April 2017

Mikea, an intern with the Parks and Recreation Department, is developing a proposal for the new trapezoidal Springdale Park. The figure below shows her scale drawing of the proposed park with 3 side lengths and the radius of the merry-go-round given in inches. In Mikea's scale drawing, 1 inch represents 1.5 feet.
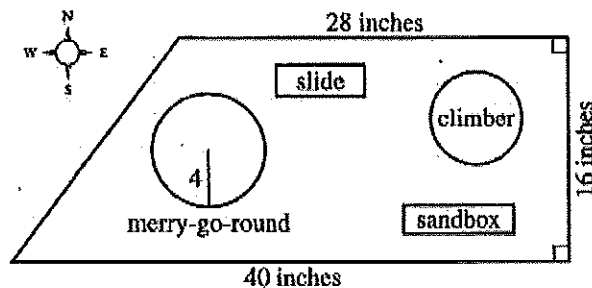
34. The length of the south side of the park is what percent of the length of the north side?

    F. 112%

    G. 124%

    H. $142\frac{6}{7}\%$

    J. 175%

    K. 250%

ACT April 2016

23. Keanu bought a new laptop computer and paid a discount price that was 20% less than the $1,000 list price. He also paid tax on the laptop equal to 6% of the discount price. What is the total amount Keanu paid for the laptop computer?

    A. $752
    B. $806
    C. $848
    D. $860
    E. $986

Answers: 2J, 34H, 23C

15. Pay Attention to Units!

Anytime a problem mentions units (miles, hours, inches, etc.), you may have to convert your answer. Annotate as you read the problem (underline or circle the units).

April 2017

33. Mikea's proposal includes installing a fence on the perimeter of the park. What is the perimeter, in *feet*, of the park?

   A. 84
   B. 88
   C. 104
   D. 126
   E. 156

Mikea, an intern with the Parks and Recreation Department, is developing a proposal for the new trapezoidal Springdale Park. The figure below shows her scale drawing of the proposed park with 3 side lengths and the radius of the merry-go-round given in inches. In Mikea's scale drawing, 1 inch represents 1.5 feet.
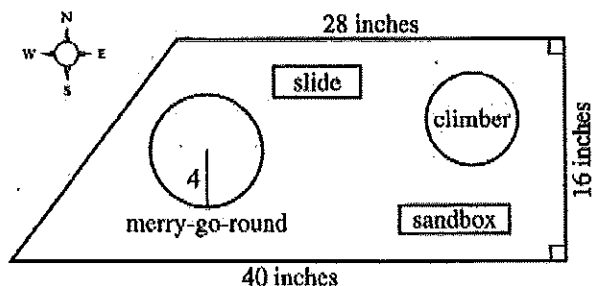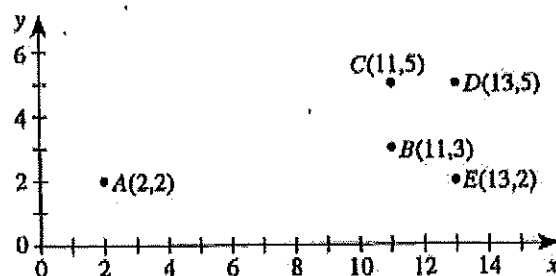

April 2016

48. Which of the following values is closest to the number of miles between Stars A and D ?

   F. 2.0×10^{10}
   G. 5.2×10^{11}
   H. 1.9×10^{12}
   J. 6.7×10^{13}
   K. 8.6×10^{21}

The points graphed in the standard (x,y) coordinate plane below show the positions of 5 stars in a plane relative to a point represented by the origin, where each coordinate unit equals 1 light-year. A *light-year* is the distance that light travels in 1 year, and 1 light-year $\approx 5.9 \times 10^{12}$ miles. The distance from Star A to Star D is approximately 11.4 light-years. Star A has a mass of 3 solar masses; and Stars B, C, D, and E each have a mass of 1 solar mass.

April 2017

47. A room has a rectangular floor that is 15 feet by 21 feet. What is the area of the floor in square *yards* ?

   A. 24
   B. 35
   C. 36
   D. 105
   E. 144