TIPS FOR THE ACT MATHEMATICS

60 Minutes **60 Questions/ Problems**	24 **Prealgebra** and **Elementary** Algebra questions 18 **Intermediate Algebra** and **Coordinate Geometry** questions 14 **Plane Geometry** questions, and 4 **Trigonometry** questions
	You can use a calculator on the Math section, but not the Science Reasoning section.
	No formulas are supplied.
	Figures are not necessarily drawn to scale, but they almost always are.
	Geometric figures are in a plane, and lines are straight.
	All questions are multiple-choice with five answer choices.
	Do not linger over problems that take too much time. Solve as many as possible; then return to the others in the time that remains.
	Unlike other standardized tests, there is no wrong answer penalty on the ACT. That means ***answer every question!*** Getting the correct answer is the only thing that counts.
4 Questions for Strategic Problem Solving	1. **What do I want to know?** Underline the part of the question that tells you what you're looking for. 2. **What do I know already?** Identify all the information you are directly given. Also, think about what formulas and facts you know about the topic that might be useful. 3. **What can I do with what I know already?** Look at the problem and analyze what you've been given. See what you can deduce based on what's there. Also, see if you can make what you've been given look like something more familiar. If you're really stuck, just write anything you know is true about the problem. 4. **Is that what I want to know? Am I done?** With some problems, you could go on deducing forever. After each discovery, stop and see if it helped you, and if you are closer to an answer. You may be done already!
Problem-Solving Using Algebraic Models	• Write a verbal model (see p. 33, Algebra 2) • Assign labels • Write an algebraic model • Solve the algebraic model • Answer the question

Other Problem Solving Strategies	• Draw a diagram or graph (p. 796, Algebra 1) • Look for a pattern • Guess, check and revise • Make a organized list or table (see p. 930, Algebra 2) • Use an equation or a formula • Use a proportion • Break into simpler parts • Solve a simpler problem • Work backwards
3-Step Method for Translation	1. **Identify the variable(s).** Find the unknown value or values. Assign variables to these quantities. 2. **Identify the values.** Underline these numbers. The test makers will sometimes give extra numbers that you don't need to solve the problem. You may want to cross out these distracting numbers. 3. **Find and translate the words that represent math operations or formulas.** Keep in mind, not all information given is needed to solve the problem.
How to Make an Educated Guess	• **Start with the middle answer choice (C) or (H).** Plug the middle answer choice back into the problem. • **Eliminate** If the middle answer choice creates a true statement, you are finished. If the middle answer choice is too small or too large, eliminate it and the two smaller/larger choices. Since the answer choices are almost always listed from least to greatest, the first two choices are smaller than (C) or (H), and the last two are greater. If the middle choice does not fit, you can also eliminate two other choices. • **Work your way up or down** Continue plugging in until you find the answer.
Strategies for Problem Solving	1. **Understand the Problem.** Read the problem carefully. Organize the information you are given and decide what you need to find. Determine whether some of the information given is unnecessary, or whether enough information is given. Supply missing facts, if possible. 2. **Make a Plan to Solve the Problem.** Choose a strategy. Choose the correct operations. Decide if you will use a tool such as a calculator, or a graph. 3. **Carry out the plan to solve the problem.** Use the strategy and any tools you have chosen. Estimate before you calculate, if possible. Do any calculations that are needed. Answer the question that the problem asks. 4. **Check to see if your answer is reasonable.** Reread the problem and see if your answer agrees with the given information. (see p. 795, Algebra 1)

Content Information	**Prealgebra (14 problems, 23% of test)** • Operations on Number (whole, decimal and fractions) • Square roots and approximations • Exponents • Scientific notation • Factors • Ratio • Proportion
	• Percent • Elementary counting techniques • Simple probability • Data collection, representation and interpretation • Simple descriptive statistics
	Algebra (19 problems, 32% of test) • Solve an equation by plugging in a given variable • Solve an equation in terms of a variable • Factor quadratic equations • Work with problems that use exponents and radicals with variables • Solve inequalities • Solve equations with absolute value • Use and solve functions
	Trigonometry (4 problems, ≈ 7% of test) • Sine, cosine, tangent, and their inverses (right triangle)
	Coordinate Geometry (9 problems, 15% of test) • Find the distance between two points • Graph linear equation • Find the midpoint of a line segment • Write a linear equation based on a graph • Find the slope of a line based on its equation or graph • Find the y-intercept of a line from its equation or graph • Identify parallel and perpendicular lines by their slopes.
	Plane Geometry (14 problems, 23% of test) • No formulas will be provided. • Geometric terms and formulas • Lines and Angles • Parallel Lines • Triangle Relationships • Pythagorean Theorem and Special Triangles • Area and Perimeter • Circles • Transformations • Volume and Surface Area

MATHEMATICS TEST

15 Minutes—15 Questions

DIRECTIONS: Solve each problem, choose the correct answer, and then fill in the corresponding oval on your answer document.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

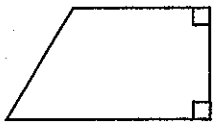
You are permitted to use a calculator on this test. You may use your calculator for any problems you choose, but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed.

1. Illustrations 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.

DO YOUR FIGURING HERE.

1. The figure shown below belongs to which of the following classifications?



I. Polygon
II. Quadrilateral
III. Trapezoid

A. I only
B. II only
C. III only
D. II and III only
E. I, II, and III

2. If the lengths, in inches, of all three sides of a triangle are integers, and one side is 7 inches long, what is the smallest possible perimeter of the triangle?

F. 9 inches
G. 10 inches
H. 15 inches
J. 21 inches
K. 24 inches

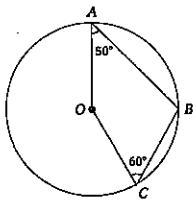
GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

3. A certain triangle has a height that is three times as long as its base. If it has an area of 216 square inches, what is the length, in inches, of its base?

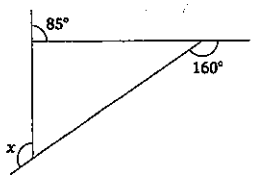
   A. 6
   B. 12
   C. 18
   D. 54
   E. 108

4. In the figure below, points A, B, and C lie on the circumference of circle O. What is the measure of $\angle AOC$?



   F. 110°
   G. 120°
   H. 130°
   J. 140°
   K. 150°

5. In the figure below, what is the measure of x?



   A. 115°
   B. 120°
   C. 130°
   D. 140°
   E. 150°

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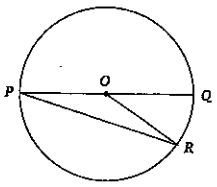
6. In circle O shown below, P, O, and Q are colinear. If $\angle ROQ$ measures 50°, what is the measure of $\angle RPQ$?

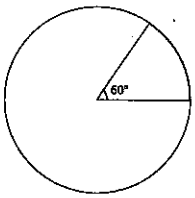


F. 20°
G. 25°
H. 30°
J. 35°
K. 40°

7. A triangle has sides of lengths 6 units, 8 units, and 10 units, and a square has a perimeter of 28 units. What is the positive difference, in square units, between the area of the triangle and the area of the square?

A. 1
B. 4
C. 25
D. 49
E. 148

8. The circle below has a diameter of 6 inches. What is the length, in inches, of the arc that has a central angle of 60°?



F. π
G. $\frac{3\pi}{2}$
H. 2π
J. 3π
K. 6π

DO YOUR FIGURING HERE.

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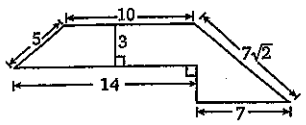
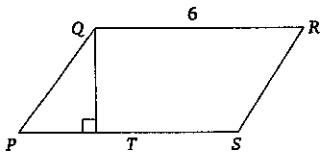
DO YOUR FIGURING HERE.

9. What is the area, in square units, of the figure below?



A. 147
B. 108.5
C. 91
D. 60.5
E. $39 + 7\sqrt{2}$

10. In the figure below, the area of parallelogram $PQRS$ is 24 square units. Segment QT is perpendicular to segment PS, and point T is the midpoint of segment PS. What is the perimeter, in units, of $PQRS$?



F. 20
G. 22
H. 24
J. 26
K. 28

11. How many units long is the radius of a circle that has a circumference of 24π?

A. 6
B. 12
C. 24
D. 12π
E. 24π

GO ON TO THE NEXT PAGE.

12. A right triangle has sides measuring 5 inches, 12 inches, and 13 inches. What is the area, in square inches, of this triangle?

F. 12
G. 15
H. 30
J. 60
K. 65

13. A circle has a diameter of 8 in. What is the area, in square inches, of this circle?

A. 4
B. 8π
C. 16
D. 16π
E. 64π

14. What is the volume of a rectangular prism with a length of 8 in., a width of 7 in., and a height of 6 in.?

F. 21 $in.^2$
G. 48 $in.^2$
H. 56 $in.^2$
J. 256 $in.^3$
K. 336 $in.^3$

15. The diagonal of a square has a length of 8 cm. What is the area of the square?

A. $4\sqrt{2}$ cm^2
B. $8\sqrt{2}$ cm^2
C. 16 cm^2
D. 32 cm^2
E. 64 cm^2

DO YOUR FIGURING HERE.

END OF TEST.

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

Applied Mathematics Level 3

Individuals with Level 3 skills can set up and solve problems with a single type of mathematical operation (addition, subtraction, multiplication, or division) on whole numbers, fractions, decimals, or percentages.

1. You work at a fruit market. Bananas cost 50¢ a pound. A customer hands you a bunch of bananas that weighs 3 pounds. How much should you charge for the bunch of bananas?

   A. $0.17
   B. $0.50
   C. $0.53
   D. $1.50
   E. $3.50

2. To make curtains for a living room window for a customer, you will need 3 pieces of fabric in the following lengths: 3 feet, 3 feet, and 5 feet. What is the total length of fabric you will need?

   A. 8 feet
   B. 11 feet
   C. 14 feet
   D. 30 feet
   E. 45 feet

3. You sell pies at a farmers' market for $7.50 each. A group of 5 kids wants to pitch in equally to share one of your pies. How much will each of them need to pay to buy a whole pie together?

   A. $0.75
   B. $1.50
   C. $2.50
   D. $3.75
   E. $7.50

Applied Mathematics Level 4

Individuals with Level 4 skills can set up and solve problems with one or two different mathematical operations (addition, subtraction, multiplication, or division) on whole numbers, fractions, decimals, or percentages.

1. You are a receptionist at a doctor's office. A patient's bill for a checkup totals $85.00. The patient's health insurance requires the patient to pay 20% of the total bill. How much should the patient pay for the checkup?

   A. $ 4.25
   B. $ 8.50
   C. $17.00
   D. $42.50
   E. $68.00

2. You are scheduling a new delivery route and you need to find out how long it will take a driver to complete the route. You start the route at 9:50 A.M. and finish at 2:05 P.M. How long does it take to drive the route?

   A. 4 hours 15 minutes
   B. 4 hours 55 minutes
   C. 5 hours 15 minutes
   D. 5 hours 45 minutes
   E. 7 hours 45 minutes

3. As a bowling instructor, you calculate your bowlers' averages during tournaments. In 5 games, one bowler had the following scores: 143, 156, 172, 133, and 167. What was that bowler's average?

   A. 147
   B. 153
   C. 154
   D. 156
   E. 161

Applied Mathematics Level 5

Individuals with Level 5 skills can set up and solve problems with several steps of logic and calculation involving a mixture of whole numbers, fractions, decimals, or percentages.

1. As a laboratory assistant, you measure chemicals using the metric system. For your current research, you need to measure out 45 grams of sodium chloride. The bottle you are using lists the amount in ounces. About how many ounces of sodium chloride will you need?

   A. 0.1
   B. 1.6
   C. 28.4
   D. 720.0
   E. 1.275.8

2. You are making a welding fixture and must cut down a length of steel tubing from $19\frac{3}{8}$ inches to $11\frac{9}{16}$ inches. When you cut the tubing, you will waste $\frac{1}{16}$ inch of it because of the width of the saw cut. If the leftover piece is long enough, you will use it in another fixture. How long will this leftover piece be?

   A. $7\frac{3}{4}$
   B. $7\frac{13}{16}$
   C. $7\frac{7}{8}$
   D. $8\frac{1}{4}$
   E. $8\frac{3}{4}$

3. You are doing marketing research to find out the purchasing potential of students in the community. Based on the latest census, there are 9,860 students in a population of 62,400 people. What percent of the total population do students make up?

   A. 6.3
   B. 7.3
   C. 15.8
   D. 52.5
   E. 84.2

Applied Mathematics Level 6

Individuals with Level 6 skills can set up and solve problems containing unnecessary information and requiring multiple steps. Calculations involve a mixture of whole numbers, fractions, decimals, or percentages.

1. You are a school photographer taking individual and class pictures for 2 classes of 21 students each. On average, each individual picture takes 3 minutes and a class picture takes 10 minutes. About how long should it take you to get all of the pictures?

   A. 1 hour 3 minutes
   B. 1 hour 13 minutes
   C. 2 hours 6 minutes
   D. 2 hours 16 minutes
   E. 2 hours 26 minutes

2. You are applying fertilizer to a football field. The field is 360 feet long and 160 feet wide. You use 8 pounds of fertilizer per 1,000 square feet. The fertilizer comes in 50-pound bags. How many bags of fertilizer will you need to complete the job?

   A. 6
   B. 7
   C. 8
   D. 9
   E. 10

3. At Appliance City you sold a refrigerator to a customer for $369.00. Appliance City advertises that if a customer finds the same refrigerator anywhere else for a lower price, you will give a refund equal to 150% of the price difference. The customer returns with a Kitchen Stuff Inc. ad that shows the same refrigerator for $335.00. After you give the advertised refund to the customer, what is the customer's final cost?

   A. $ 51.00
   B. $219.00
   C. $318.00
   D. $335.00
   E. $364.00

Applied Mathematics Level 7

Individuals with Level 7 skills can set up and solve complex problems requiring extensive calculations. They can calculate rate of change, set up and manipulate complex ratios and proportions, find multiple areas or volumes of two- and three-dimensional shapes, find the best economic value of several alternatives, and locate errors in multiple-step calculations.

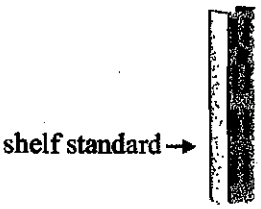
1. You are an urban planner assessing the growth of a city. Ten years ago, the city's population was 249,583. Its current population is 318,270. By about what percentage has the city grown over the past ten years?

   A. 13%
   B. 22%
   C. 28%
   D. 69%
   E. 78%

2. You are comparing prices from 2 office supply stores. Your office needs 5 cases of blue paper. Home & Office Headquarters lists a case of paper at $25.85 with a 10% discount on an order of 5 cases or more. Office Supplies R Us lists a case of paper at $27.36 with a 15% discount on 5 cases or more. Delivery costs from Home & Office Headquarters are $2.50 per case. Office Supplies R Us will deliver for $10 an order. What is the least amount that you would have to spend for the paper?

   A. $ 23.26
   B. $ 33.26
   C. $ 71.80
   D. $126.28
   E. $141.75

3. To complete adjustable bookshelves, a customer at your store needs to purchase shelf standards to attach to the wall. The customer wants the shelving to be 9 feet high and 10 feet wide. The shelf standards come in 48-inch and 60-inch sections. The 48-inch sections cost $12.95; the 60-inch sections cost $16.95. The standards should be placed 1 foot from each end of a shelf and no more than 24 inches apart. Before tax is added, what will be the total cost of the shelf standards the customer will need?



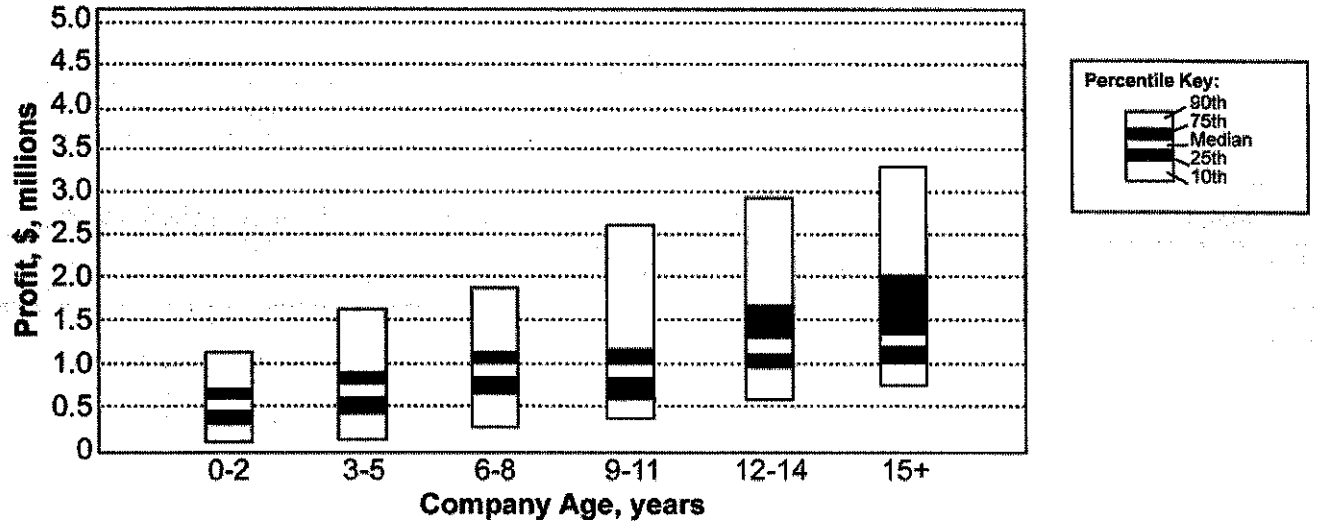
   A. $ 89.70
   B. $119.60
   C. $129.50
   D. $149.50
   E. $179.40

3. You are a finance research assistant with a company that purchases smaller companies. You use the chart and table shown to compare prospective buys with current companies. Your company only purchases companies in the 90th percentile. Which company fits that prerequisite for purchase?

A. JMO Clothiers
B. Kenai Kampgoods
C. Northmann Cookies
D. Pierre's
E. Wolfware Software

4. You work for a business that purchases smaller companies. You use the information shown to compare prospective buys with current companies. Your supervisor wants you to look at Office Bytes, a 6-year-old computer company that earned a $723,000 profit last year. Using the chart and information shown, how does Office Bytes compare to Wolfware Software?

A. Both Office Bytes and Wolfware Software are in the Median percentile.
B. Both Office Bytes and Wolfware Software are in the 75th percentile.
C. Office Bytes is in the 25th percentile, and Wolfware Software is in the Median percentile.
D. Office Bytes is in the Median percentile, and Wolfware Software is in the 75th percentile.
E. Office Bytes is in the 75th percentile, and Wolfware Software is in the Median percentile.



Prospective Purchases:

Company	Age	CEO	Headquarters	Last Year Profit
JMO Clothiers	8	John Smith	Louisville, KY	$1,021,000
Kenai Kampgoods	10	Rachel Stonebrook	Juneau, AK	$721,000
Northmann Cookies	16	Kay Northmann	Mason City, IA	$1,315,000
Pierre's	5	Pierre LePez	San Diego, CA	$1,016,000
Wolfware Software	1	Raul Gomez	Denver, CO	$514,000

3. As a medical assistant, you must plot patients' growth on a growth chart. You have just measured a 14-year-old girl who has grown four centimeters in the last year. According to the chart shown, this patient's growth rate is:

A. equal to the average rate of boys her age.
B. equal to the average rate of girls her age.
C. off the chart for growth rate.
D. slightly less than the average rate of girls her age.
E. slightly more than the average rate of girls her age.