

# ACT strategies discussion

## 2/8 staff meeting

The biggest challenge(enemy) most scholars will face is TIME!

The ACT Math section has 60 questions and gives 60 minutes to solve them; one min/question!

The best tip to combat this is to NOT force each student to try to answer every question. For some students answering 60 questions in 60 minutes will be easy, but for others it is an impossible task.

| Scale Score | Raw Score | Scale Score | Raw Score | Scale Score | Raw Score |
|-------------|-----------|-------------|-----------|-------------|-----------|
| 36          | 59–60     | 27          | 45–46     | 18          | 27–28     |
| 35          | 57–58     | 26          | 43–44     | 17          | 24–26     |
| 34          | 55–56     | 25          | 41–42     | 16          | 19–23     |
| 33          | 54        | 24          | 38–40     | 15          | 15–18     |
| 32          | 53        | 23          | 36–37     | 14          | 12–14     |
| 31          | 52        | 22          | 34–35     | 13          | 10–11     |
| 30          | 50–51     | 21          | 33        | 12          | 8–9       |
| 29          | 49        | 20          | 31–32     | 11          | 6–7       |
| 28          | 47–48     | 19          | 29–30     | 10          | 5         |

**\*\*Each test has its own conversion chart for scaling the raw scores so there is no exact chart\*\***

I suggest each student identify their target scale score then look to see how many questions they need to get correct as a raw score to meet their goal.

For example if their goal score is a 30 then they need to correctly answer 50 questions.

For this student I would suggest they answer 55 questions (gives them 5 misses)

Another example: if the goal score is a 24 then they need to correctly answer 39 or so.

For this student I would suggest they answer 45 questions (gives them 6 misses)

\*Note that this means they would pick a letter combo of the day A/F or C/H and would likely get a few of the 15 they blindly guessed correct as well!

Each student must identify which questions are easy (do them immediately), medium (they will take some time –come back after all the easy ones), and hard (immediately skip and choose letter combo of the day)

A note on guessing strategies: There are other options besides letter combo of the day but they all take more time. Since time is the #1 issue for most scholars I would suggest the letter combo of the day in general. However, if a scholar can very quickly rule out some answers (can be difficult to do for some types of questions) then that is a good way to improve the probability of a guess being correct.

An example of this would be a question like: If the value, to the nearest thousandth, of  $\cos \theta$  is  $-0.385$ , which of the following could be true about  $\theta$ ?

- A.  $0 \leq \theta \leq \frac{\pi}{6}$       B.  $\frac{\pi}{6} \leq \theta \leq \frac{\pi}{3}$       C.  $\frac{\pi}{3} \leq \theta \leq \frac{\pi}{2}$       D.  $\frac{\pi}{2} \leq \theta \leq \frac{2\pi}{3}$       E.  $\frac{2\pi}{3} \leq \theta \leq \pi$

## WHAT TO EXPECT ON THE ACT MATH TEST

The math section usually breaks down into the following:

### 33 Algebra questions

- 14 pre-algebra questions based on math terminology(integers, prime numbers, factors, multiples and so on), basic number theory(rules of zero, order of operations and so on), and manipulation of fractions and decimals
- 10 elementary algebra questions based on inequalities, linear equations, ratios, percents and averages
- 9 intermediate algebra questions based on exponents, roots, systems of equations, rational functions, function notation, and logarithms

### 23 Geometry questions

- 14 plane geometry questions based on angles, lengths, triangles, quadrilaterals, circles, perimeter, area, and volume
- 9 coordinate geometry questions based on slope, distance, midpoint, parallel and perpendicular lines, points of intersection, and graphing

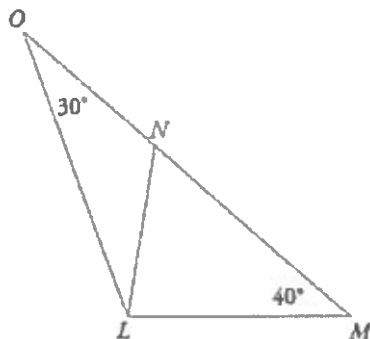
### 4 Trigonometry questions

- 4 questions based on basic sine, cosine, and tangent functions (Soh-Cah-Toa), trig identities including cosecant, secant, and cotangent functions, and graphs of trig functions

# Some skills I would suggest teaching your students

## AND PRACTICING!!!

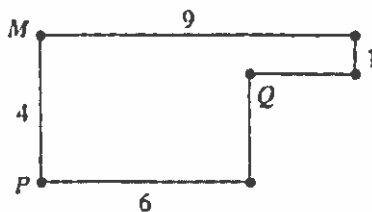
**Estimation:** In the figure below,  $O$ ,  $N$ , and  $M$  are collinear. If the lengths of  $ON$  and  $NL$  are the same, the measure of angle  $LON$  is  $30^\circ$ , and angle  $LMN$  is  $40^\circ$ , what is the measure of angle  $NLM$ ?



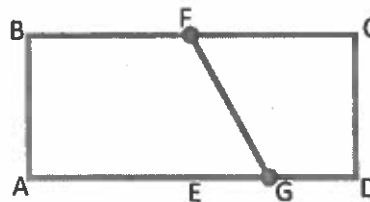
- A.  $30^\circ$
- B.  $80^\circ$
- C.  $90^\circ$
- D.  $110^\circ$
- E.  $120^\circ$

**Example 2:** A room has the shape and dimensions in meters given below. A support beam is located halfway between point  $P$  and point  $Q$ . Which of the following is the distance of the beam from point  $M$ ?

- (F) 3
- (G)  $\sqrt{15.25}$
- (H)  $\sqrt{36.75}$
- (J)  $\sqrt{51.25}$
- (K) 9



**Example 3:** In the rectangle shown,  $E$  and  $F$  are midpoints of  $\overline{AD}$  and  $\overline{BC}$  respectively.  $G$  is the midpoint of  $\overline{ED}$ . What is the area of the quadrilateral  $ABFG$  if the area of the rectangle  $ABCD$  is 48?



- A. 18
- B. 24
- C. 30
- D. 36
- E. 42

**WORD PROBLEMS:** Many students have an aversion to word problems. They see a big block of text and immediately are overwhelmed and shut down. Two options are available at this point. 1) Student chooses letter combo of the day and moves on; or 2) handle the word problem in smaller chunks or bites.

Most ACT word problems are actually fairly easy problems. Use smaller bites to help students with word problem aversion to realize they aren't as bad as they fear

Example: The oxygen saturation level of a river is found by dividing the amount of dissolved oxygen the river water currently has per liter by the dissolved oxygen capacity per liter of the water and then converting to a percent. If the river currently has 7.3 milligrams of dissolved oxygen per liter of water and the dissolved oxygen capacity is 9.8 milligrams per liter, what is the oxygen saturation level, to the nearest percent?

- A. 34%      B. 70%      C. 73%      D. 74%      E. 98%

Douglas wants to draw a circle graph showing the favorite colors of his friends. When he polled his friends asking each their favorite color, 25% of his friends said red; 30% of his friends said blue; 20% of his friends said green; 10% of his friends said purple; and the remaining friends said colors other than red, blue, green, and purple. The colors other than red, blue, green, and purple will be grouped together in an Other sector. What will be the degree measure of the Other sector?

- A.  $108^\circ$       B.  $54^\circ$       C.  $27^\circ$       D.  $15^\circ$       E.  $10^\circ$

When Angela was cleaning her refrigerator, she found 2 bottles of catsup. Looking at the labels, she noticed that the capacity of the larger bottle was twice the capacity of the smaller bottle. She estimated that the smaller bottle was about  $\frac{1}{3}$  full of catsup and the larger bottle was about  $\frac{2}{3}$  full of catsup. She poured all the catsup from the smaller bottle into the larger bottle. Then about how full was the larger bottle?

- A.  $\frac{2}{9}$  full      B.  $\frac{1}{2}$  full      C.  $\frac{5}{6}$  full      D. Completely full      E. Overflowing

**PICK VALUES FOR VARIABLES:** This is actually the most powerful strategy in my mind. This strategy can turn extremely difficult problems into very simple arithmetic problems!

Example: John has  $x$  red pencils, and three times as many red pencils as blue pencils. If he has four more yellow pencils than blue pencils, then in terms of  $x$ , how many yellow pencils does John have?

- A.  $x + 4$       B.  $x + 7$       C.  $\frac{x}{6}$       D.  $\frac{x+12}{6}$       E.  $\frac{x+12}{3}$

If  $a < -1$ , which of the following best describes a general relationship between  $a^3$  and  $a^2$ ?

- F.  $a^3 > a^2$       G.  $a^3 < a^2$       H.  $a^3 = a^2$       J.  $a^3 > -a^2$       K.  $a^3 > \frac{1}{a^2}$

There are  $n$  students in a class. If, among those students,  $p\%$  play at least 1 musical instrument, which of the following general expressions represents the number of students who play NO musical instrument?

- A.  $np$       B.  $.01np$       C.  $\frac{(100-p)n}{100}$       D.  $\frac{(1-p)n}{.01}$       E.  $100(1-p)n$

If  $x - z = 6$  and  $y = 3x - 2 - 3z$ , then  $y = ?$

- A. 2      B. 4      C. 14      D. 16      E. 18

**USE THE ANSWER CHOICES:** Most students know this trick, but it is still useful to demonstrate it to them and to practice it

Amy drove the 200 miles to New Orleans at an average speed 10 miles per hour faster than her usual average speed. If she completed the trip in 1 hour less than usual, what is her usual driving speed, in miles per hour?

- A. 20      B. 30      C. 40      D. 50      E. 60

A bag of pennies could be divided among 6 children, or 7 children, or 8 children, with each getting the same number, and with 1 penny left over in each case. What is the smallest number of pennies that could be in the bag?

- F. 22      G. 43      H. 57      J. 169      K. 337

If  $x$  and  $y$  are positive integers such that the greatest common factor of  $x^2y^2$  and  $xy^3$  is 45, then which of the following could  $y$  equal?

- A. 45      B. 15      C. 9      D. 5      E. 3

If the area of a certain rectangle is 54 and its width is 3 less than its length, which of the following could be the length of the rectangle?

- F. 5      G. 6      H. 7      J. 8      K. 9

**MAKE SURE THEY UNDERSTAND CERTAIN PHRASING THEY MAY NEVER HAVE**

**SEEN BEFORE:** The ACT wording is very mathematically precise and may include phrases you have never taught your students. Make sure you expose them to these phrases. These few problems are just a couple of examples of phrasing that may not be familiar to students. The more they practice with real ACT exams, the more familiarity they will gain with the terms.

If  $I = PRT$ , then which of the following is an expression for  $R$  in terms of  $I$ ,  $P$ , and  $T$ ?

- A.  $IPT$       B.  $I - PT$       C.  $\frac{I}{PT}$       D.  $\frac{PT}{I}$       E.  $\frac{2}{IPT}$

If the sum of three consecutive odd integers is 33, what is the value of the largest of the three integers?

- F. 7      G. 9      H. 11      J. 13      K. 15

Point A is to be graphed in a quadrant, not on an axis of the standard  $(x, y)$  coordinate plane. If the  $x$ -coordinate and the  $y$ -coordinate of point A are to have opposite signs, then point A must be located in:

- A. Quadrant II only      B. Quadrant IV only      C. Quadrant I or III only  
D. Quadrant I or IV only      E. Quadrant II or IV only

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**TEACH ANY TIPS AND TRICKS AND TECHNIQUES YOU KNOW MAKE THINGS**

**EASIER:** Many types of problems have techniques that will aid students in getting correct answers simply and quickly.

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For Ratios I like a strategy called the x factor strategy

An animal shelter takes care of cats and dogs. The ratio of cats to dogs is 6:5. If there are 132 animals at the shelter, how many cats are there?

- A. 6            B. 60            C. 66            D. 72            E. 80



You can simplify the answer choices by substituting actual numbers for the variables. If you use this strategy, remember that numbers on the ACT can be positive or negative and are sometimes whole numbers and sometimes fractions. You should also be careful not to use 1 or 0 as your stand-ins because they can create “identities,” which can lead to more than one seemingly correct answer choice. Consider the following example:

If  $a$  and  $b$  are positive consecutive odd integers, where  $b > a$ , which of the following is equal to  $b^2 - a^2$ ?

- A.  $2a$
- B.  $4a$
- C.  $2a + 2$
- D.  $2a + 4$
- E.  $4a + 4$

You are given that both  $a$  and  $b$  are positive consecutive odd integers, and that  $b$  is greater than  $a$ . Pick two numbers that fit the criteria:  $a = 3$  and  $b = 5$ . Now, substitute these numbers into  $b^2 - a^2$ :  $5^2 = 25$  and  $3^2 = 9$ ; therefore,  $b^2 - a^2 = 16$ . Now, plug the value that you selected for  $a$  into the answer choices until one of them yields 16, as follows:

- $2(3) = 6$ ; eliminate answer choice A.
- $4(3) = 12$ ; eliminate answer choice B.
- $2(3) + 2 = 8$ ; eliminate answer choice C.
- $2(3) + 4 = 10$ ; eliminate answer choice D.
- $4(3) + 4 = 16$ ; answer choice E is correct.

### Simplify the Question

Some of the questions in the Mathematics section will involve new operations that you have never seen. They may appear very unfair at first. However, if you take a moment to read the whole question, you'll find that the new “operation” is defined for you. This means that these questions are pretty straightforward substitution questions. Just apply the definition that is given in the question and the actual mathematics part is usually easy. Consider the following example:

Let the operation  $\oplus$  be defined by  $x \oplus y = \frac{x - y}{x + y}$  for all numbers  $x$  and  $y$ , where  $x \neq y$ . If  $3 \oplus 2 = 2 \oplus z$ , what is the value of  $z$ ?

- A.  $-3$
- B.  $1\frac{1}{3}$
- C.  $1\frac{2}{3}$
- D.  $3$
- E.  $5$

In this “defining a new operation” problem, simply substitute the given values into the operation. Find the value of  $2 \oplus 3$ , according to the definition of  $x \oplus y$ . Since  $x \oplus y = \frac{x - y}{x + y}$ ,  $2 \oplus 3 = \frac{2 - 3}{2 + 3}$ , or  $-\frac{1}{5}$ . Now, substitute  $-\frac{1}{5}$  for  $2 \oplus 3$  in the second equation:  $-\frac{1}{5} = \frac{2 - z}{2 + z}$ . Cross multiply and solve for  $z$ :

