Date Completed: _____
Mentor Initials: _____

A mentor can change everything.

"Advanced" Problems Part Three

Please take under timed pressure: ***30 minutes.***

This quiz is comprised of questions you will encounter in the final 10-15 questions of the ACT Math test. As you complete each question, please consider if, on an actual test, you would:

- **ATTACK** the question: you can answer it quickly and accurately, possibly using a strategy or a formula from the ACT Math Formula Sheet.
- **SKIP** the question: you don't know how to answer it quickly and do not have a strategy or formula to use *(Remember: try to eliminate as many answers as possible before guessing).*

1. A fair spinner with 3 equally sized regions and an arrow has regions numbered $1, 2,$ and 3, respectively, and a second fair spinner with 4 equally sized regions and an arrow has regions numbered $1, 2, 3$ and 4, respectively. The arrows are both spun at the same time, and the numbers that the 2 arrows land on are multiplied together. What is the probability that this product is an even number?

A. $\frac{1}{3}$

B. $\frac{3}{7}$

C. $\frac{1}{2}$

D. $\frac{2}{3}$

E. $\frac{3}{4}$

2. Given $3 \leq x \leq 12$ and $6 \leq y \leq 18$, what is the largest value of $\frac{x-y}{y}$, if it can be determined?

A. $\frac{2}{3}$

B. $\frac{5}{6}$

C. 1

D. 2

E. Cannot be determined from the given information

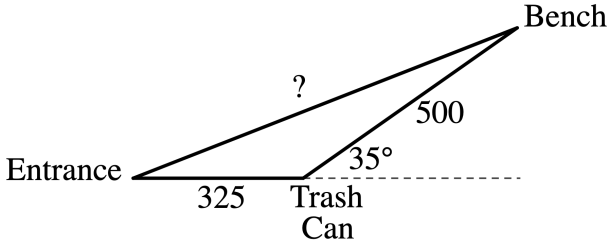
3. The set of values of x that satisfies $-2|-x+5| < -6$ is the same set of values of x that satisfies:

A. $x < 2$
B. $-2 < x < 2$
C. $x < -2$ or $x > 2$
D. $2 < x < 8$
E. $x < 2$ or $x > 8$

4. In the complex numbers, where $i^2 = -1$, what complex number x is a solution to the equation $x(4-5i) = 7$?

A. $\frac{4-5i}{7}$
B. $28-35i$
C. $\frac{28}{41}+\frac{35i}{41}$
D. $\frac{28}{9}-\frac{35i}{9}$
E. 7

5. As shown below, Alli walked her dog 325 feet due east from the entrance of a dog park to a trash can and then walked 500 feet in a straight line 35° north of east to a bench. Which of the following expressions is equal to the distance, in feet, between the entrance and the bench?



A. $\frac{850}{\cos(35°)}$
B. $\frac{325}{\cos(25°)}+500$
C. $\frac{325}{\sin(145°)}+500$
D. $\sqrt{500^2+325^2-2(500)(325)\cos(35°)}$
E. $\sqrt{500^2+325^2-2(500)(325)\cos(145°)}$

6. A 65-foot-long rectangular swimming pool with vertical sides is 4 feet deep at the shallow end and 12 feet deep at the deep end. The bottom of the pool slopes downward at a constant angle from horizontal along the length of the pool. Which of the following expressions gives this constant angle?

A. $\tan^{-1}(\frac{4}{65})$

B. $\tan^{-1}(\frac{8}{65})$

C. $\tan^{-1}(\frac{12}{65})$

D. $\tan^{-1}(\frac{1}{3})$

E. $\tan^{-1}(\frac{2}{3})$

7. A 30-liter solution that is 10% salt is mixed with a 40-liter solution that is 45% salt. The combined solution is what percent salt?

A. 20%
B. 25%
C. 30%
D. 35%
E. 40%

8. What is the sum of the first 10 terms of an arithmetic sequence that has a third term of 14 and an eighth term of 34?

A. 170
B. 210
C. 240
D. 280
E. 340

9. The sale price of a jacket is 15% off the original price. The clearance price of the jacket is 40% off the sale price. The clearance price is what percent off the original price?

A. 45%
B. 49%
C. 51%
D. 55%
E. 60%

10. Ned and Sally May are driving to a barbecue in Memphis 270 miles from where they are both currently located. Ned is going to drive 60 mph for 3 hours, stop to rest for one hour, and then drive 45 mph for 2 hours. Sally May is going to drive 60 mph all the way through without stopping. If Ned leaves at noon, when should Sally May leave so that they arrive at the exact same time?

A. 1:00PM
B. 1:30PM
C. 2:00PM
D. 2:15PM
E. 2:30PM

11. The degree measures of the interior angles of a certain hexagon are in the ratio 2:2:3:3:4:6. What is the measure of the largest interior angle of this hexagon?

A. 180°
B. 186°
C. 192°
D. 210°
E. 216°

12. For all real values of x such that $-1 < x < 0$, which of the following expression has the smallest value?

A. $\frac{x}{10}$
B. $\frac{1}{x}$
C. $-\frac{1}{x}$
D. x
E. $-2x$

13. Timmy drove his truck three miles north, four miles east, and two more miles north. He then stops, pulls out a map and draws a straight line from his starting point to his current position. How long is the straight line he drew? What is the angle of his bearing? Round to the nearest $\frac{1}{2}$ mile and whole degree.

(Note: bearing is calculated as the angle opening clockwise from true north)

A. 6.0 miles @ 39° east of north

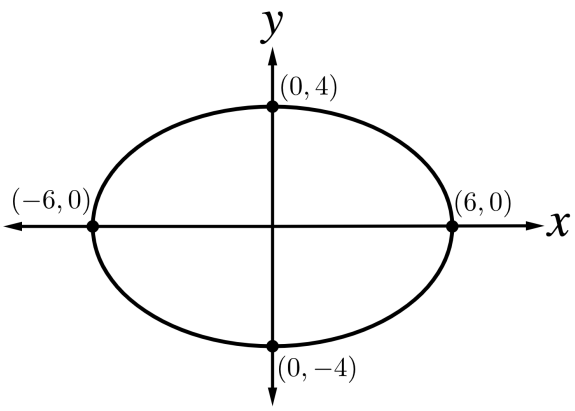
B. 6.5 miles @ 51° east of north

C. 6.5 miles @ 39° east of north

D. 7.0 miles @ 39° east of north

E. 7.0 miles @ 40° east of north

14. Which of the following equations determines the ellipse shown in the standard (x, y) coordinate plane below?



A. $6x^2 + 4y^2 = 24$
B. $4x^2 + 6y^2 = 24$
C. $16x^2 + 36y^2 = 24$
D. $16x^2 + 36y^2 = 576$
E. $36x^2 + 16y^2 = 576$

15. There are 8 points in a plane, and no 3 of the points are collinear. These 8 points, taken 2 points at a time, determine how many distinct lines?

A. 16
B. 28
C. 30
D. 32
E. 56

16. Which of the following is the solution set of $8^{x^2} = 4^{2x+2}$?

A. $\{-\frac{2}{3}, 2\}$

B. $\{-1,1\}$

C. $\{0, \frac{2}{3}\}$

D. $\{1,2\}$

E. $\{\frac{3}{2}, 2\}$

17. The average of 8 test scores is a. When the highest and lowest scores are removed from the 8 scores, the average is b. Which of the following is an expression for the average of the highest score and lowest score?

A. $\frac{8a+6b}{2}$

B. $\frac{a-b}{2}$

C. $4a - 3b$

D. $\frac{a+b}{2}$

E. $8a - 6b$

18. The ratio of the perimeters of two squares is 3: 4. If the area of the smaller square is 56.25 square feet, what is the length, in feet, of a side of the larger square?

A. 8
B. 10
C. 12
D. 14
E. 16

19. For all positive x and y, $x^{\frac{2}{3}}y^{\frac{3}{5}}$ can be written in which of the following radical forms?

A. $\sqrt[8]{x^7y^6}$

B. $\sqrt[8]{x^5y^6}$

C. $\sqrt[15]{x^9y^{10}}$

D. $\sqrt[15]{x^{10}y^9}$

E. $\sqrt[15]{x^{10}y^{12}}$

20. There are 60 file folders, each 0.35 inches thick, that will be placed in drawers. Each drawer can hold file folders with a combined thickness of no more than 5.75 inches. No folder is split between 2 drawers. All but one drawer will hold the maximum number of folders. What is the combined thickness, in inches, of the folders that are in the partially filled drawer?

A. 2.2
B. 3
C. 3.2
D. 4
E. 4.2