

Preparing for the ACT Math Portion

Dr. Daryl Stephens, ETSU Math Department - stephen@etsu.edu

Check my faculty web page at <http://faculty.etsu.edu/stephen/> for a PDF copy of this handout

Here are some questions similar to those that might be on the ACT. We will work through these together in the workshop. There is a full-blown practice ACT assessment made of actual old questions at the ACT website.

- <http://www.actstudent.org/sampletest/test1/math/mathtest.html> – This has several short sets of practice questions. It is interactive; you click on a choice and it shows you the correct answer and how to work each problem. It has 60 math questions, just like the real test.
- <http://www.act.org/aap/pdf/preparing.pdf> – This is the same as the printed *Preparing for the ACT* booklet. It also has 60 math questions.

Some other free preparation materials:

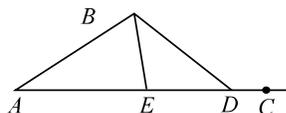
- <http://www.sparknotes.com/testprep/books/act/chapter8.rhtml> – This is the first page of three chapters on math. It is the free version of a book that is sold on preparing for the ACT. Keep clicking on “continue to the next section>>>” after you read each page, or use the drop-down menu.
- http://education.yahoo.com/college/essentials/practice_tests/act/math/question/1.html – 10 math questions with answers (interactive)
- <http://www.algebra.com/testing/scripts/st.mpl> – two practice math reasoning tests similar to the ACT and SAT

Note: the actual ACT has five choices for each of the 60 questions. This review guide doesn't have multiple choice answers for all the questions.

1. Which of these is equivalent to $(5y^4)^2$?
(A) $10y^6$ (B) $10y^8$ (C) $25y^8$ (D) $25y^6$ (E) $5y^8$
2. Two cell phone companies, Integratel and Youcell, both have a calling plan with 500 peak minutes. Integratel charges a one-time \$100 setup fee and \$40 a month for their. Youcell has a setup fee of \$120 and charges \$35 monthly. How many months would a person subscribe and pay the same total for either provider?
(F) 2 (G) 4 (H) 10 (J) 12 (K) 18
3. $(3x - 5)^2 = ?$
(A) $9x - 15$ (B) $9x^2 + 25$ (C) $9x^2 - 25$
(D) $9x^2 - 30x + 25$ (E) $9x^2 + 30x - 25$
4. If $\frac{1}{4}q + \frac{1}{5}q = 1$, what is the value of q ?

5. Hattie went to the candle store in the mall during a tax-free weekend and saw all the candles in the store were on sale for 17% off. She had her calculator with her and programmed it to give her the sale price once she put in the original price. What expression did she use to find the sale price if the original price in dollars is represented by m ?

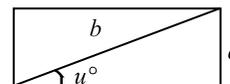
(A) $m + 0.17m$ (B) $-0.17m$ (C) $0.17m$ (D) $m - 17$ (E) $m - 0.17m$



6. In the figure, $m\angle BDC = 125^\circ$, $m\angle BAE = 65^\circ$, and $m\angle BED = 85^\circ$. What is $m\angle ABE$?

7. Breanna drove 720 miles to visit some friends. She averaged 60 miles per hour on the trip out. Coming back, she wanted her drive to be two hours shorter. How many miles per hour faster must she drive on the way back to do this?

8. Which equation is true for this rectangle with the given diagonal? (Angle u is measured in degrees; b and c are in centimeters.)

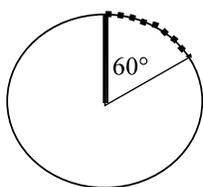


(F) $\cot u = \frac{c}{b}$ (G) $\tan u = \frac{b}{c}$ (H) $\csc u = \frac{c}{b}$

(J) $\sin u = \frac{b}{c}$ (K) $\tan u = \frac{c}{b}$

9. The line with equation $y = ax + b$ is perpendicular to the line with equation $y = cx + d$. Which of the following statements must be true?

(A) $a = c$ (B) $a > c$ (C) $a = -\frac{1}{c}$ (D) $a = -c$ (E) $a = \frac{1}{c}$



10. A hot tub cover with a radius of 30 feet is designed as shown with a zippered flap. The zipper along one side of the flap and the edge of the cover. To the nearest whole foot, how long is the zipper?

11. An extension ladder is to be propped up against a building so the top of it is 10 feet from the ground. The ladder is propped up at a 70° angle relative to the ground. How far away from the building is the bottom of the ladder?

(A) $\frac{\tan 70^\circ}{10}$ (B) $10 \tan 70^\circ$ (C) $\frac{10}{\tan 70^\circ}$ (D) $\frac{1}{10 \tan 70^\circ}$ (E) $\tan\left(\frac{10}{70^\circ}\right)$

12. When a population grows at a constant rate of $r\%$ per year, the formula

$$P(t) = p_0 \left(1 + \frac{r}{100} \right)^t$$

models the size of the population t years after an initial

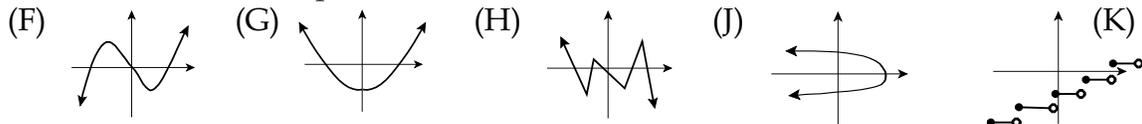
population of p_0 .

The city of McKinney, Texas, had an incredible average annual growth rate of 15% per year from 2000 to 2005. The population in 2000 was 54,369. What expression would model the city's population in 2005?

- (F) $54,369(.115)^5$ (G) $54,369(1.5)^{0.15}$ (H) $54,369(1.15)^{0.15}$
 (J) $54,369(1.15)^5$ (K) $1.15(54,369)^5$

13. In the Cartesian coordinate plane, the midpoint of \overline{PQ} is at $(7,4)$ and P is located at $(1,6)$. If (x,y) represents the coordinates of Q , what is $x + y$?

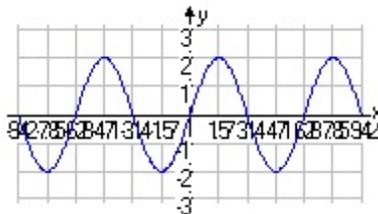
14. An *even* function is one for which $f(-x) = f(x)$ for every value of x in the domain of f . Which of these is a depiction of an even function?



15. A number is increased by 50% and then decreased by 25%. The result is what percent of the original number?

- (A) 75% (B) 125% (C) 50% (D) 112.5% (E) 150%

16. The equation of the graph shown is $y = a \sin (bx) + c$. Which statement is true about a , b , and c ?



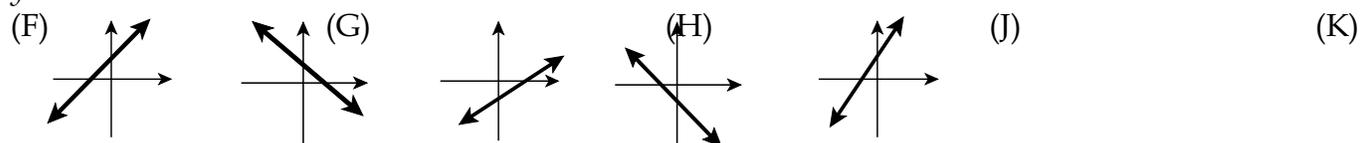
- (F) $a < 0$ (G) $b = 0$ (H) $a > 0$ and $c = 0$
 (J) $0 < b < 1$ and $0 < a < 1$ (K) $c < 0$ and $a = 1$

17. If $\log(5 + x) - \log(x - 4) = \log 2$, what is the value of x ?

18. What is the value of $\log_{95} 5 + \log_{95} 19$?

19. What is the largest possible product of two even integers whose sum is 38?

20. All of these graphs have the same scale. Which one could be the graph of $y = -2x + 5$?



21. If 60% of the weight of a 2400-pound car should be supported by the rear tires, how much weight should be supported by the front tires?

Answers

1. C 2. G 3. D 4. $\frac{20}{9}$ 5. E 6. 20°
 7. 12 mph (going: 60 mph; return 72 mph) 8. K 9. C
 10. 31 ft. (Flap is a sector of a circle; use $s = r\theta$ with $\theta = \frac{\pi}{3}$. Zipper is $15 \cdot \frac{\pi}{3}$ ft long. 11. C 12. J 13. 15 14. G 15. D 16. H 17. 13
 18. 1 19. 360 20. G 21. 960 lb

Final Thoughts

- Check your work.
- Bring extra batteries for your calculator. A spare calculator is okay also.
- You can't use a cell phone calculator, a TI-89, or a TI-92, or any other calculator that has a computer algebra system built in.
- Be sure to answer the question that's being asked!
- Remember common formulas such as:
 - ▶ $d = rt$
 - ▶ $\sin^2\theta + \cos^2\theta = 1$
 - ▶ Pythagorean Theorem $a^2 + b^2 = c^2$
 - ▶ Trig definitions, e.g., $\tan A = \frac{\text{opposite}}{\text{adjacent}}$