
Diagnostic Test

Middle School Mathematics

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Testing Tips

1. **Do not read anything into the question.** Do not assume that the test writer is looking for something else than what is asked. Stick to the question as written and do not read extra things into it.
2. **Read the question and all the choices twice before answering the question.** You may miss something by not carefully reading and then re-reading both the question and the answers. If you really do not have a clue as to the right answer, leave it blank on the first time through. Go on to the other questions, as they may provide a clue as to how to answer the skipped questions. If later on, you still cannot answer the skipped ones...**guess**. The only penalty for guessing is that you *might* get it wrong. Only one thing is certain; if you do not put anything down, you will get it wrong!
3. **Turn the question into a statement.** Look at the wording of the questions. The syntax of the question usually provides a clue. Does it seem more familiar as a statement rather than as a question? Does it sound strange? By turning a question into a statement, you may be able to spot if an answer sounds right, and it may trigger memories of material you have read.
4. **Look for hidden clues.** It is actually very difficult to compose multiple-foil (choice) questions without giving away part of the answer in the options presented. In most multiple-choice questions, you can often readily eliminate one or two of the potential answers. This leaves you with only two real possibilities and automatically your odds go to fifty-fifty for very little work.
5. **Trust your instincts.** For every fact that you have read, you subconsciously retain something of that knowledge. On questions about which you are not really certain, go with your basic instincts. **Your first impression on how to answer a question is usually correct.**
6. **Mark your answers directly on the test booklet.** Do not bother trying to fill in the optical scan sheet on the first pass through the test. *Mark your answers carefully when you transcribe them to the scan sheet.*
7. **Watch the clock!** You have a set amount of time to answer the questions. Do not get bogged down trying to answer a single question at the expense of ten questions you can more readily answer.

1. $7t - 4 \cdot 2t + 3t \cdot 4 \div 2 =$
(Average Rigor)

- A. $5t$
- B. 0
- C. $31t$
- D. $18t$

2. Which statement is an example of the identity axiom of addition?
(Easy)

- A. $3 + -3 = 0$
- B. $3x = 3x + 0$
- C. $3 \cdot \frac{1}{3} = 1$
- D. $3 + 2x = 2x + 3$

3. Joe reads 20 words/min., and Jan reads 80 words/min. How many minutes will it take Joe to read the same number of words that it takes Jan 40 minutes to read?
(Rigorous)

- A. 10
- B. 20
- C. 80
- D. 160

4. Change $\overline{.63}$ into a fraction in simplest form.
(Average Rigor)

- A. $63/100$
- B. $7/11$
- C. $6 \frac{3}{10}$
- D. $2/3$

5. Given $W =$ whole numbers $N =$ natural numbers
 $Z =$ integers
 $R =$ rational numbers
 $I =$ irrational numbers

Which of the following is not true?
(Easy)

- A. $R \subset I$
- B. $W \subset Z$
- C. $Z \subset R$
- D. $N \subset W$

6. $(3.8 \times 10^{17}) \times (.5 \times 10^{-12})$
(Average Rigor)

- A. 19×10^5
- B. 1.9×10^5
- C. 1.9×10^6
- D. 1.9×10^7

7. Find the GCF of $2^2 \cdot 3^2 \cdot 5$ and $2^2 \cdot 3 \cdot 7$.
(Average Rigor)

- A. $2^5 \cdot 3^3 \cdot 5 \cdot 7$
- B. $2 \cdot 3 \cdot 5 \cdot 7$
- C. $2^2 \cdot 3$
- D. $2^3 \cdot 3^2 \cdot 5 \cdot 7$

8. If three cups of concentrate are needed to make 2 gallons of fruit punch, how many cups are needed to make 5 gallons?
(Easy)

- A. 6 cups
- B. 7 cups
- C. 7.5 cups
- D. 10 cups

9. Simplify: $\frac{10}{1+3i}$
(Rigorous)

- A. $-1.25(1-3i)$
- B. $1.25(1+3i)$
- C. $1+3i$
- D. $1-3i$

10. Simplify: $\sqrt{27} + \sqrt{75}$
(Rigorous)

- A. $8\sqrt{3}$
- B. 34
- C. $34\sqrt{3}$
- D. $15\sqrt{3}$

11. Identify the proper sequencing of subskills when teaching graphing inequalities in two dimensions
(Easy)

- A. Shading regions, graphing lines, graphing points, determining whether a line is solid or broken
- B. Graphing points, graphing lines, determining whether a line is solid or broken, shading regions
- C. Graphing points, shading regions, determining whether a line is solid or broken, graphing lines
- D. Graphing lines, determining whether a line is solid or broken, graphing points, shading regions

12. What would be the seventh term of the expanded binomial $(2a+b)^8$?
(Rigorous)

- A. $2ab^7$
- B. $41a^4b^4$
- C. $112a^2b^6$
- D. $16ab^7$

13. Determine the volume of a sphere to the nearest cm if the surface area is 113 cm^2 .
(Rigorous)

A. 113 cm^3
B. 339 cm^3
C. 37.7 cm^3
D. 226 cm^3

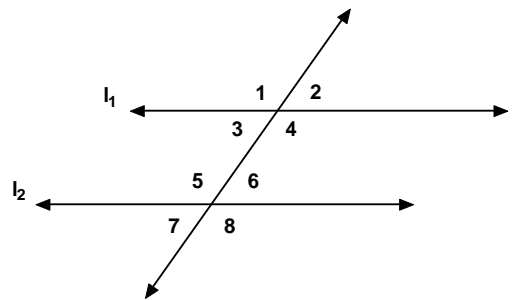
14. Ginny and Nick head back to their respective colleges after being home for the weekend. They leave their house at the same time and drive for 4 hours. Ginny drives due south at the average rate of 60 miles per hour and Nick drives due east at the average rate of 60 miles per hour. What is the straight-line distance between them, in miles, at the end of the 4 hours?
(Rigorous)

A. $120\sqrt{2}$
B. 240
C. $240\sqrt{2}$
D. 288

15. Which is a postulate?
(Easy)

A. The sum of the angles in any triangle is 180° .
B. A line intersects a plane in one point.
C. Two intersecting lines form congruent vertical angles.
D. Any segment is congruent to itself.

16. Given $l_1 \parallel l_2$ which of the following is true?
(Average Rigor)



A. $\angle 1$ and $\angle 8$ are congruent and alternate interior angles
B. $\angle 2$ and $\angle 3$ are congruent and corresponding angles
C. $\angle 3$ and $\angle 4$ are adjacent and supplementary angles
D. $\angle 3$ and $\angle 5$ are adjacent and supplementary angles

17. When you begin by assuming the conclusion of a theorem is false, then show that through a sequence of logically correct steps you contradict an accepted fact, this is known as *(Easy)*

- A. Inductive reasoning
- B. Direct proof
- C. Indirect proof
- D. Exhaustive proof

18. Given that $QO \perp NP$ and $QO = NP$, quadrilateral $NOPQ$ can most accurately be described as a *(Easy)*

- A. Parallelogram
- B. Rectangle
- C. Square
- D. Rhombus

19. What is the slope of any line parallel to the line $2x + 4y = 4$? *(Rigorous)*

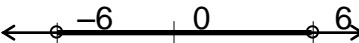
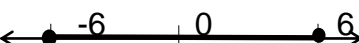
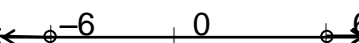
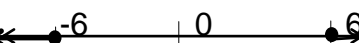
- A. -2
- B. -1
- C. $-\frac{1}{2}$
- D. 2

20. Which set illustrates a function? *(Easy)*

- A. $\{(0,1) (0,2) (0,3) (0,4)\}$
- B. $\{(3, 9) (-3, 9)(4, 16)(-4, 16)\}$
- C. $\{(1, 2) (2, 3) (3, 4) (1, 4)\}$
- D. $\{(2, 4) (3, 6) (4, 8) (4, 16)\}$

21. Graph the solution:
 $|x| + 7 < 13$

(Rigorous)

- A. 
- B. 
- C. 
- D. 

22. A boat travels 30 miles upstream in three hours. It makes the return trip in one and a half hours. What is the speed of the boat in still water?

(Rigorous)

- A. 10 mph
- B. 15 mph
- C. 20 mph
- D. 30 mph

23. State the domain of the function

$$f(x) = \frac{3x-6}{x^2-25}$$

(Rigorous)

- A. $x \neq 2$
- B. $x \neq 5, -5$
- C. $x \neq 2, -2$
- D. $x \neq 5$

24. If a horse will probably win three races out of ten, what are the odds that he will win?

(Rigorous)

- A. 3:10
- B. 7:10
- C. 3:7
- D. 7:3

25. Compute the median for the following data set:

{12, 19, 13, 16, 17, 14}

(Average Rigor)

- A. 14.5
- B. 15.17
- C. 15
- D. 16

26. Corporate salaries are listed for several employees. Which would be the best measure of central tendency?

\$24,000 \$24,000 \$26,000
\$28,000 \$30,000 \$120,000

(Average Rigor)

- A. Mean
- B. Median
- C. Mode
- D. No difference

27. Determine the number of subsets of set K .

$K = \{4, 5, 6, 7\}$

(Average Rigor)

- A. 15
- B. 16
- C. 17
- D. 18

28. A student scored in the 87th percentile on a standardized test. Which would be the best interpretation of his score? (Easy)

- A. Only 13% of the students who took the test scored higher.
- B. This student should be getting mostly Bs on his report card.
- C. This student performed below average on the test.
- D. This is the equivalent of missing 13 questions on a 100 question exam.

29. A sack of candy has 3 peppermints, 2 butterscotch drops and 3 cinnamon drops. One candy is drawn and replaced, then another candy is drawn; what is the probability that both will be butterscotch? (Average Rigor)

- A. $\frac{1}{2}$
- B. $\frac{1}{28}$
- C. $\frac{1}{4}$
- D. $\frac{1}{16}$

Constructed Response Question

30. A man sold two cars for \$6,500 each. On the first car he made a profit of 30% and on the second car he lost 30%.

(a) Did he make a profit overall or did he lose money?

(b) What was the percentage of his net gain or loss?

Answer Key

1. A

2. B

3. D

4. B

5. A

6. B

7. C

8. C

9. D

10. A

11. B

12. C

13. A

14. C

15. D

16. C

17. C

18. C

19. C

20. B

21. A

22. B

23. B

24. C

25. C

26. B

27. B

28. A

29. D

30. (a) Since both cars were sold for the same price, the first car was cheaper than the second. Since the percentage is the same in both cases, the profit on the first car was smaller than the loss on the second car. Hence, even without calculating the actual amounts, one can conclude that the man lost money overall.

(b) The cost x of the first car can be calculated by setting up the following proportion equation:

$$\frac{130}{100} = \frac{3500}{x}$$

Cross-multiplying and solving for x ,

$$\begin{aligned} 130x &= 350000 \\ \Rightarrow x &= \frac{350000}{130} = 2692.31 \end{aligned}$$

The cost y of the second car can be calculated by setting up the following proportion equation:

$$\frac{70}{100} = \frac{3500}{y}$$

Cross-multiplying and solving for y ,

$$\begin{aligned}70y &= 350000 \\ \Rightarrow y &= \frac{350000}{70} = 5000\end{aligned}$$

Net cost of the two cars = \$7692.31

Net sale price for the cars = \$7000

$$\text{Hence, net percentage loss} = \frac{7692.31 - 7000}{7692.31} \times 100 = \frac{692.31}{7692.31} \times 100 = 9\%$$