



GENERAL EDUCATIONAL DEVELOPMENT
TESTING SERVICE

Passing the 2002 GED Mathematics Test:

Using 2008 Data to
Focus Instruction

GED Administrators Conference
July 9, 2009



Improving Candidate Performance

- 1. Identify/compare questions ranked 11 – 30 in difficulty for candidates scoring within +/- 1 SEM of the cut score (NEAR) with those scoring 1 to 2 SEM below the cut score (BELOW).**
- 2. Analyze responses to frequently missed questions to identify strategies for improvement.**
- 3. Develop materials to implement those strategies.**

Comparing Question Sets

- Are the two groups challenged by the same or different questions?
- Are item formats – MC, NG, CG – equally challenging for both groups?
- Are the two groups more likely to find the challenging questions on the same or different halves (Part I – calculator; Part II – no calculator) of the test?

A comparison questions 11 – 30 frequently missed by the two groups of candidates : **Form #1**

Near	Below	Near	Below	Near	Below
1. A	1. *	8. H	8. D	14. N	14. *
2. B	2. I	9. I	9. B	15. O	15. P
3. C	3. F	10. J	10. J	16. P	16. Q
4. D	4. *	11. K	11. O	17. Q	17. *
5. E	5. E	12. L	12. T	18. R	18. M
6. F	6. K	13. M	13. G	19. S	19. L
7. G	7. H			20. T	20. N

A comparison questions 11 – 30 frequently missed by the two groups of candidates : **Form #2**

Near	Below	Near	Below	Near	Below
1. A	1. *	8. H	8. C	14. N	14. S
2. B	2. D	9. I	9. G	15. O	15. O
3. C	3. N	10. J	10. I	16. P	16. M
4. D	4. H	11. K	11. J	17. Q	17. L
5. E	5. A	12. L	12. K	18. R	18. Q
6. F	6. F	13. M	13. *	19. S	19. *
7. G	7. B			20. T	20. P

A comparison questions 11 – 30 frequently missed by the two groups of candidates : **Form #3**

Near	Below	Near	Below	Near	Below
1. A	1. B	8. H	8. G	14. N	14. M
2. B	2. *	9. I	9. I	15. O	15. J
3. C	3. A	10. J	10. F	16. P	16. R
4. D	4. C	11. K	11. H	17. Q	17. P
5. E	5. K	12. L	12. Q	18. R	18. L
6. F	6. D	13. M	13. *	19. S	19. O
7. G	7. N			20. T	20. *

Comparison Summary

Form 1	Form 2	Form 3
16 of 20 questions are the same.	17 of 20 questions are the same.	17 of 20 questions are the same.

The vast majority (83.3%) of the questions are the same for both groups.

In what format – MC, NG, CG – were these questions presented?

Summary Data for Question Formats

Form	MC	NG	CG
1	18	1	1
2	16	2	2
3	18	1	1
Totals	52	4	4
Percent	86.7	6.7*	6.7**
% on Test	80	16	4
% of expectation	108.3	41.7	167.5

Notes: Some of the Below candidate questions designated with an asterisk were also Number Grid items. However, the representation for the Below group was 13.3% of the questions analyzed, which is still below the 16% level of such questions on the tests.

Each of the two Coordinate Grid questions not found among questions ranked 11 – 30 was ranked #1 in difficulty on its form. This concern should be addressed, but time limitations prevent that from being done in this presentation.

Summary Data for Use of Calculator

Form	Questions from Part I	Questions from Part II
1	11	9
2	11	9
3	12	8

No Part I over-representation, either by individual form or combined total, is statistically significant.

What is the magnitude of the change that must occur before each group becomes successful on the GED Mathematics Test?

To enable a near candidate to become successful, increase the number correct by only 1 or 2 questions.

To enable a below candidate to become successful, increase the number correct by only 3 to 5 questions.



The Focus for Today's Presentation

1. Which way is up?

2. Maybe I should check.

3. Is that enough?

4. Don't stop in the middle of the street.

Which Way Is Up?

Questions Involving Ratios

A survey firm randomly selected 1200 people to test a new product. Of those selected, 400 were male.

Which fraction represents the ratio of females to males selected to test the new product?

- (1) $\frac{1}{3}$ (2) $\frac{1}{2}$ (3) $\frac{2}{3}$ (4) $\frac{3}{2}$ (5) $\frac{2}{1}$

A survey firm randomly selected 1200 people to test a new product. Of those selected, 400 were male.

Which fraction represents the ratio of females to males selected to test the new product?

- (1) $1/3$ (2) $1/2$ (3) $2/3$ (4) $3/2$ (5) $2/1$

How many females? $1200 - 400 = 800$

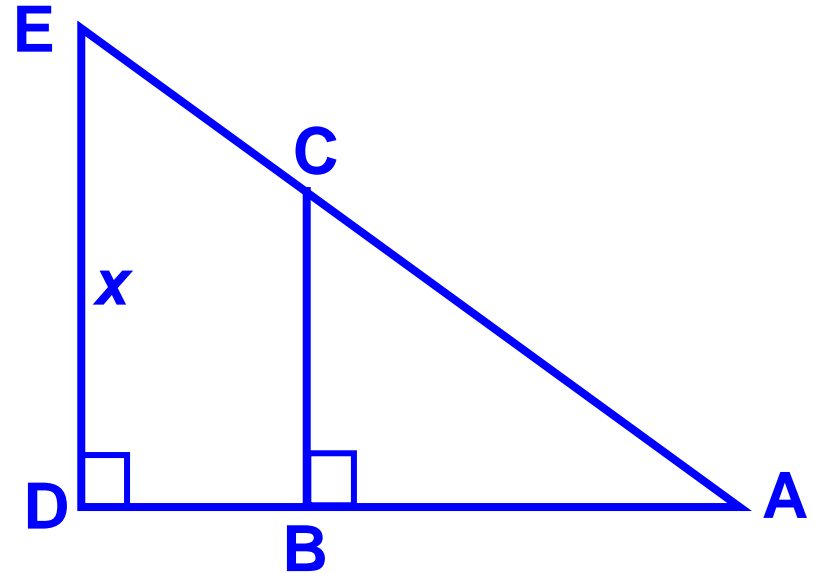
Were more females or males selected? females

The ratio of females to males is MORE THAN 1.

The most commonly selected incorrect answer: $1/2$

Which Way Is Up? Proportions

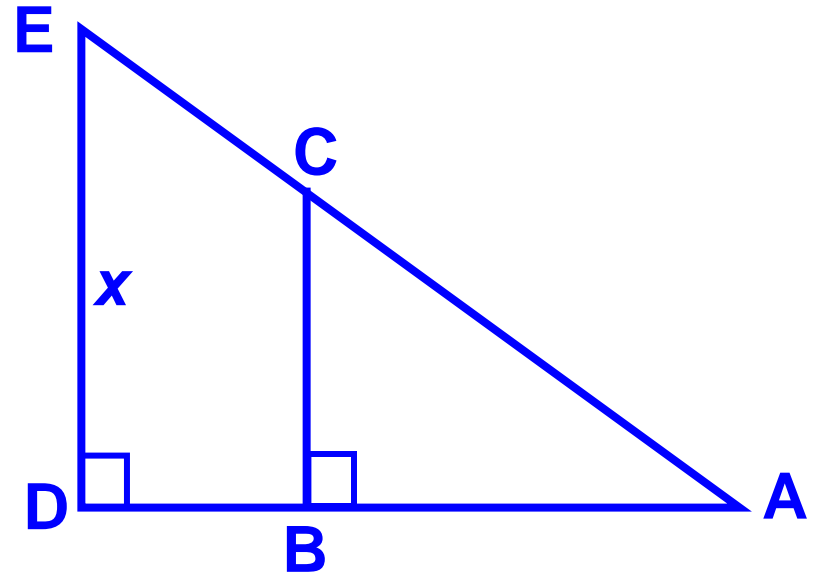
In the diagram shown, triangle ABC is similar to triangle ADE. Which proportion could be used to find the measure of x ?



- (1) $AB/BD = BC/x$
- (2) $AB/AD = BC/x$
- (3) $AC/CE = BC/x$

- (4) $AD/AE = BC/x$
- (5) $AE/AC = BC/x$

In the diagram shown, triangle ABC is similar to triangle ADE. Which proportion could be used to find the measure of x ?

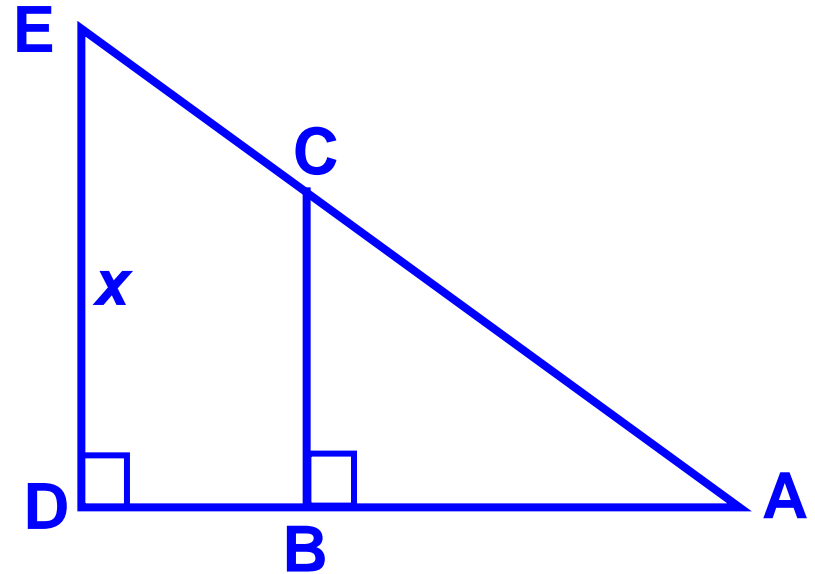


No diagram is needed to write an extended proportion involving the sides of the two triangles.

ABC is similar to
ADE

$$AB/AD = BC/DE = AC/AE$$

In the diagram shown, triangle ABC is similar to triangle ADE. Which proportion could be used to find the measure of x ?



(1) $AB/BD = BC/x$

(2) $AB/AD = BC/x$

(3) $AC/CE = BC/x$

(4) $AD/AE = BC/x$

(5) $AE/AC = BC/x$

$AB/AD = BC/DE = AC/AE$

$AB/AD = BC/x = AC/AE$

The process used to solve proportions, “cross-multiplication,” provides a simple way to determine whether a fraction is less than, greater than, or equal to $\frac{1}{2}$ (or any other fraction). In a proportion, the “equals” sign indicates that the ratios, or fractions, have the same value, so the cross-products are always equal. What happens if the relationship is unknown?

$$\frac{3}{7} ? \frac{1}{2}$$

Cross-multiply as shown below.

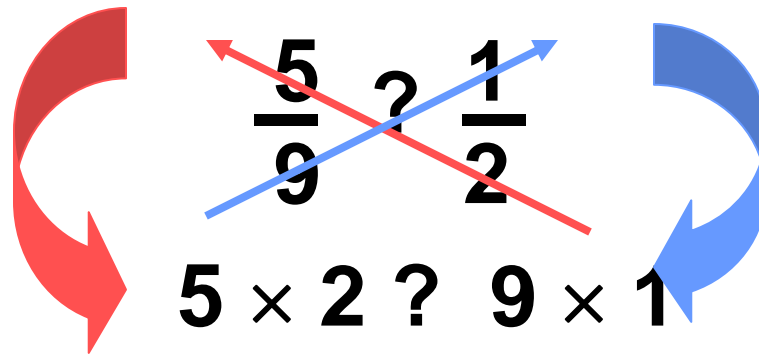
$$\frac{3}{7} ? \frac{1}{2}$$
$$3 \times 2 ? 7 \times 1$$

$$6 < 7$$

$$\frac{3}{7} < \frac{1}{2}$$

$$\frac{5}{9} ? \frac{1}{2}$$

Cross-multiply as shown below.


$$\frac{5}{9} ? \frac{1}{2}$$
$$5 \times 2 ? 9 \times 1$$

$$10 > 9$$

$$\frac{5}{9} > \frac{1}{2}$$

A marketing company surveyed 800 people and asked whether they had made internet purchases. Of those surveyed, 4/5 said that they had made at least one internet purchase.

How many of those surveyed had made at least one internet purchase?

(1) 160

(4) 480

(2) 320

(5) 640

(3) 400

A marketing company surveyed 800 people and asked whether they had made internet purchases. Of those surveyed, $\frac{4}{5}$ said that they had made at least one internet purchase.

How many of those surveyed had made at least one internet purchase?

Using some technique, students should recognize that $\frac{4}{5}$ is greater than $\frac{1}{2}$. One half of 800 is 400; more than half of 800 is more than 400.

A marketing company surveyed 800 people and asked whether they had made internet purchases. Of those surveyed, 4/5 said that they had made at least one internet purchase.

How many of those surveyed had made at least one internet purchase?

(1) 160

(2) 320

(3) 400

These are impossible (and maybe even wrong).

(4) 480

(5) 640 ★

The chances for a correct response have improved!

Maybe I Should Check. Working With Variables

Which number represents
the solution for the equation
 $2x + 36 = 4x - 24$?

(1) 2

(2) 6

(3) 10

(4) 12

(5) 30

Which number represents the solution for the equation $2x + 36 = 4x - 24$?

(1) 2

(2) 6

(3) 10

(4) 12

(5) 30

Always check to be sure, but “checking” can help “solve” a multiple-choice question.

2: $2(2) + 36 = 4(2) - 24$; $4 + 36 = 8 - 24$; $40 = -16$

6: $2(6) + 36 = 4(6) - 24$; $12 + 36 = 24 - 24$; $48 = 0$

10: $2(10) + 36 = 4(10) - 24$; $20 + 36 = 40 - 24$; $56 = 16$

12: $2(12) + 36 = 4(12) - 24$; $24 + 36 = 48 - 24$; $60 = 24$

30: $2(30) + 36 = 4(30) - 24$; $60 + 36 = 120 - 24$; $96 = 96$

**A process similar to checking –
replacing variables with
numbers – can be used to help
answer other questions in which
variables are involved
because...**

It's *not*

how smart you
are, !

A positive number less than or equal to $1/2$ is represented by x . Three expressions involving x are given:

(A) $x + 1$ (B) $1/x$ (C) $1 + x^2$

Which sequence lists these expressions from least value to greatest?

- | | | | |
|-----|---------|-----|---------|
| (1) | A, B, C | (4) | C, A, B |
| (2) | B, A, C | (5) | C, B, A |
| (3) | B, C, A | | |

A positive number less than or equal to $1/2$ is represented by x . Three expressions involving x are given:

(A) $x + 1$ (B) $1/x$ (C) $1 + x^2$

Chose a number for x that agrees with the information in the first sentence, then evaluate each expression.

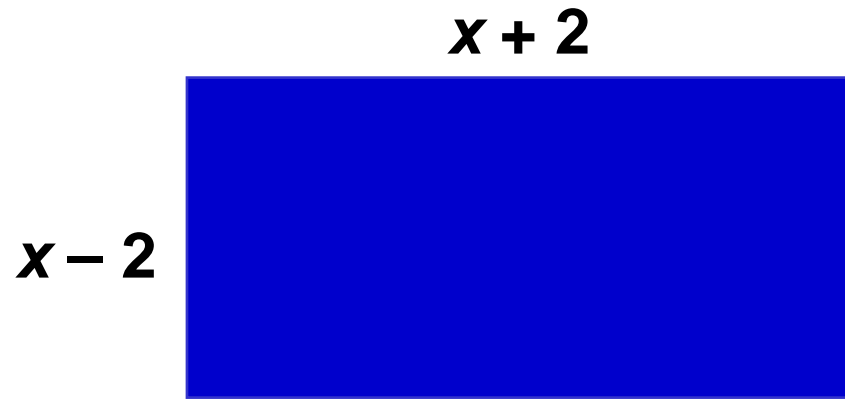
	A: $1 \frac{1}{2}$		A: 1.1
$1/2$	B: 2	0.1	B: 10
	C: $1 \frac{1}{4}$		C: 1.01

Arrange (Least \rightarrow Greatest)

$1 \frac{1}{4}$, $1 \frac{1}{2}$, 2 (C,A,B)

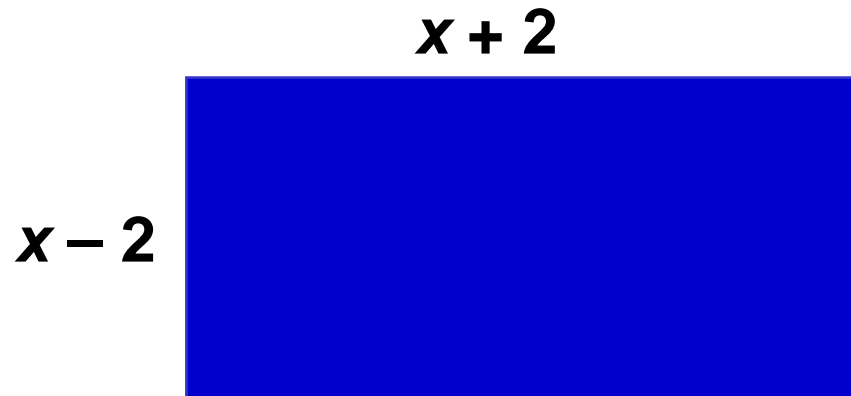
1.01, 1.1, 10 (C,A,B)

Area/Perimeter When Variables are Involved



Which expression represents the area of the rectangle?

- (1) $2x$
- (2) x^2
- (3) $x^2 - 4$
- (4) $x^2 + 4$
- (5) $x^2 - 4x - 4$



Choose a number for x . Do you see any restrictions?

(I choose 8.)

Determine the area numerically.

$(8 + 2 = 10; 8 - 2 = 6; 10 \times 6 = 60)$

Which alternative yields that value?

- | | |
|--------------------|---------------------------------------|
| (1) $2x$ | $2 \times 8 = 16$; not correct (60). |
| (2) x^2 | $8^2 = 64$; not correct. |
| (3) $x^2 - 4$ | $8^2 - 4 = 64 - 4 = 60$; correct! |
| (4) $x^2 + 4$ | $8^2 + 4 = 64 + 4 = 68$. |
| (5) $x^2 - 4x - 4$ | $8^2 - 4(8) - 4 = 64 - 32 - 4 = 28$ |

Is That Enough?

Not Enough Information Is Given

The Analysis of the responses to the most frequently missed questions showed that items using “not enough information is given” as the fifth alternative were over-represented compared to the proportion in which they appear in the tests. This over-representation was true whether or not the alternative was correct.

A research firm tested all vehicles produced by a certain auto maker to determine the mileage that customers might expect. The results are shown in the following table.

Results of Mileage Tests

Miles per gallon	Percent of vehicles
16 - 20	15.5
20.1 - 25	37.5
25.1 - 30	30.5
30.1 - 45	16.5

Results of Mileage Tests

Miles per gallon	Percent of vehicles
16 - 20	15.5
20.1 - 25	37.5
25.1 - 30	30.5
30.1 - 45	16.5

What percentage of the vehicles tested averaged 25 miles per gallon or less?

- (1) 15.5 (4) 53.0
(2) 22.0 (5) Not enough information is given.
(3) 37.5

Results of Mileage Tests

Miles per gallon	Percent of vehicles
16 - 20	15.5
20.1 - 25	37.5
25.1 - 30	30.5
30.1 - 45	16.5

What was the difference between the percentages of vehicles averaging 30 miles per gallon and those averaging 25 miles per gallon?

(1) 5.0

(4) 37.5

(2) 7.0

(5) Not enough information is given.

(3) 30.5

Results of Mileage Tests

Miles per gallon	Percent of vehicles
16 - 20	15.5
20.1 - 25	37.5
25.1 - 30	30.5
30.1 - 45	16.5

How many vehicles averaged more than 30 miles per gallon?

(1) 14

(4) 47

(2) 16

(5) Not enough information is given.

(3) 17

Don't Stop in the Middle of the Road. Finish the Process

A company charges \$60 per day plus \$0.50 per mile for truck rentals. Which amount would this company charge a customer who rented a truck for 4 days and drove it a total of 200 miles?

(1) \$100

(2) \$160

(3) \$240

(4) \$340

(5) \$440

A company charges \$60 per day plus \$0.50 per mile for truck rentals. Which amount would this company charge a customer who rented a truck for 4 days and drove it a total of 200 miles?

- (1) \$100** **$200 \times \0.50 (no charge per day)**
- (2) \$160** **$200 \times \$0.50 + \$60$ (1 day rather than 4)**
- (3) \$240** **$4 \times \60 (no charge per mile)**
- (4) \$340** **$4 \times \$60 + 200 \times \$0.50$; the key**
- (5) \$440** **$4 \times \$60 + 200$ (did not multiply)**

Speedy Mail's charges for express mail are \$0.55 for the first ounce and \$0.30 for each additional ounce. Which amount does Speedy Mail charge to express mail a 9-ounce package?

- (1) \$2.40 $8 \times \$0.30$; first ounce not included**
- (2) \$2.70 $9 \times \$0.30$; no adjustment for 1st oz.**
- (3) \$2.95 $\$0.55 + 8 \times \0.30 ; the key**
- (4) \$3.25 $\$0.55 + 9 \times \0.30 ; did not subtract 1**
- (5) \$4.95 $9 \times \$0.55$; all charged at 1st oz. rate**

In this brief time, you have seen representations of strategies that can benefit both the near and below candidates. Knowing that the content for review is the same for both groups should make your difficult task somewhat easier. Remember, the candidates do not have mountains to move. Small improvements will lead to the success we all want to see.

Wishing you and your candidates all our best,

Marty, Wanda, and Kenn

