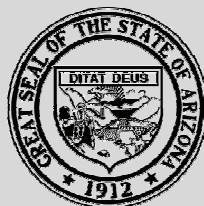


**AIMS Grade 7 Mathematics Sample Test and Think-Throughs**

**FOR STUDENTS**

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**GRADE 7**



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## Introduction

AIMS sample tests are provided to give students experience in taking AIMS. The samples are not meant to be practice tests, but they offer a sample of the kinds of questions students will find on AIMS. The best way to make sure you have the knowledge necessary to Meet and Exceed on AIMS is to *be in class, be prepared, and be on time to class* each day. Learning in class and through homework is the basis of meeting proficiency on AIMS.

It is understandable that sometimes students get nervous when taking tests. They may need some help with test-taking strategies. In this document, you will not only be able to take an AIMS sample test for mathematics, but you will also find that some of the items have explanations of the process used for solving them. This will help you think through the problems, just like you do in class. There will also be more application problems, like the ones explained, so you can try them on your own.

As you go through the sample test, please remember a few important facts.

- The AIMS Mathematics Sample Tests follow the AIMS mathematics blueprints for the 2008 Mathematics Academic Standards, but only represent half the number of items that are on the actual AIMS 3-8 and AIMS HS assessments.
- The best way to study for AIMS is to be sure you know and are able to do the grade-level performance objectives in each content area tested. Your teacher creates your lessons based on all of these grade-level mathematics standards.
- The activities contained in this document will give you experience in taking AIMS. It is not a practice test. Practice by doing your homework.
- Work through the sample test as if it is the AIMS – don't use a calculator or any other support materials. The reference sheets for formulas at the back of this guide are the same as those that are included in actual AIMS testing. Use the reference sheets to become familiar with them.

When you look at the sample problems that show the solution process, you will also see listed on the answer key the Strand, Concept, and Performance Objective that is being measured. This is listed so you can see how it connects to the lessons your teacher creates from the AZ Academic Standards. Read through the samples and see how your thoughts and answers compare.

The guide will help you make better response choices based on the knowledge that mastery of the grade-level standard provides.

Good luck and have fun!

# Mathematics Sample Test

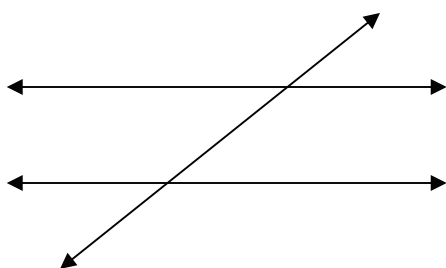
## Grade 7

**Directions:****Read each problem and select the best answer.**

- 1 A microwave oven is on sale for 20% off the regular price. The sale price is \$250.00. What is the regular price of the microwave oven?

A \$166.67  
 B \$200.00  
 C \$300.00  
 D \$312.50

- 2 If two parallel lines are cut by a non-perpendicular transversal, which type of angles are **not** congruent?



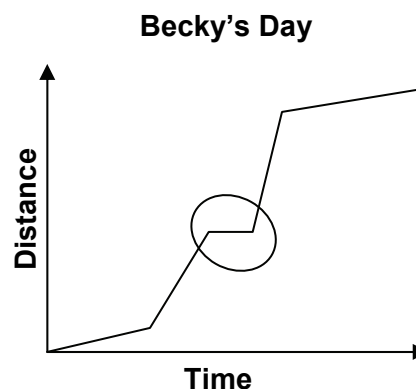
- A corresponding angles  
 B alternate interior angles  
 C alternate exterior angles  
 D same-side interior angles
- 3 The circumference of a circle measures 12.56 inches. What is the measure of the radius of the circle?
- A 2 inches  
 B 3.14 inches  
 C 4 inches  
 D 6.28 inches

- 4 The number of students (class size) in each of 7 classes is shown below.

15, 25, 25, 29, 31, 32, 37

Which class size affects the range of all 7 classes the most?

- A 15  
 B 25  
 C 29  
 D 32
- 5 Becky created the line graph below to show the distance she traveled during one day.

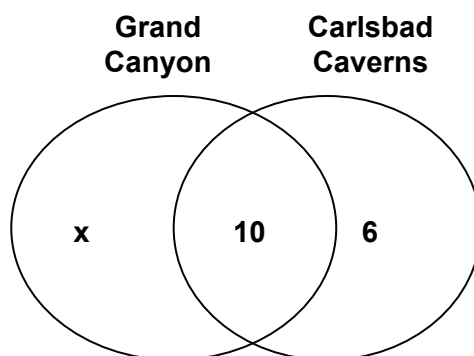


Which activity could be represented by the circled portion of the line?

- A driving to the park  
 B walking in the park  
 C driving to the library  
 D studying in the library

**Go On ►**

- 6 For which of the following would the use of a table of values **not** be helpful?
- A Determine the results of a probability experiment.
- B Find the 10<sup>th</sup> term in the number pattern 2, 5, 7, 12, ...
- C Find the area of a trapezoid with the dimensions  $b_1=10$ ,  $b_2=15$ ,  $h=4$ .
- D Determine the mean number of books checked out from a library per day for 30 days.
- 7 The Venn diagram below shows the number of students in a class who have visited the Grand Canyon, Carlsbad Caverns, or both. There are 34 students in the class, and all of the students have visited at least one of the locations.



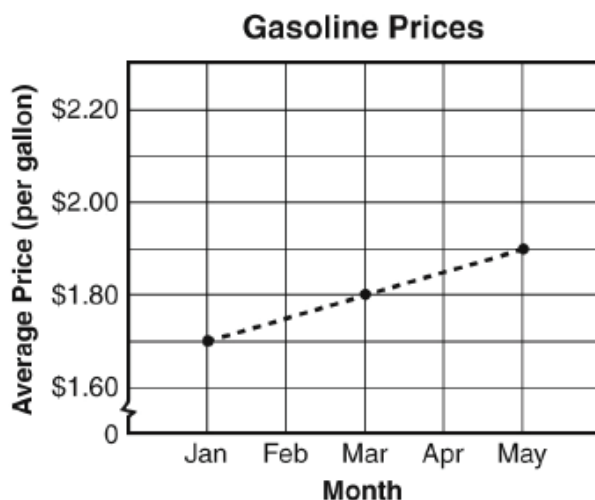
What is the number of students,  $x$ , who have only visited the Grand Canyon?

- A  $x = 16$
- B  $x = 18$
- C  $x = 24$
- D  $x = 28$
- 8 What is the value of the expression when  $x = 5$  and  $y = -2$ ?

$$\frac{1}{2}y - x$$

- A  $-3$
- B  $-4$
- C  $-6$
- D  $-7$

- 9 The graph below shows the increase in average gasoline prices from Jan. through May.



If gasoline prices continue to increase at the same rate, what will be the average gasoline price in July of that same year?

- A \$1.90  
 B \$1.95  
 C \$2.00  
 D \$2.05
- 10 Max, Owen, Elise, and Cara went to a school carnival. They each played the dart throw, ring toss, water shoot, and basketball throw. Each student won a different game.

Clues:

- Max didn't score any points at the dart throw.
- Elise correctly tossed 2 rings, but did not win the ring toss.
- Cara won a bear for outscoring everyone at the water shoot.
- Owen scored more than anyone at the basketball throw.

Based on the clues, which game did Max win?

- A dart throw  
 B ring toss  
 C water shoot  
 D basketball throw

11 Which expression has a value of  $-3$ ?

- A  $-7 - (4)$
- B  $-4 - (-7)$
- C  $-7 - (-4)$
- D  $-4 - (7)$

12 Between which two consecutive integers is the value of this irrational number?

$$\sqrt{117}$$

- A 8 and 9
- B 10 and 11
- C 14 and 15
- D 20 and 21

13 Using the results in the tables, what is the probability of a spinner landing on the letter P in both experiments?

Experiment  
A

Spin	Color
1	B
2	P
3	B
4	W
5	P
6	G
7	G
8	P
9	W
10	B

Experiment  
B

Spin	Color
1	P
2	P
3	B
4	W
5	W
6	P
7	G
8	P
9	W
10	B

- A  $\frac{3}{10}$
- B  $\frac{2}{5}$
- C  $\frac{3}{25}$
- D  $\frac{7}{20}$

14 The radius of a circular fish pond is 4 feet. What is the circumference of the pond in terms of  $\pi$ ?

- A  $4\pi$
- B  $4\pi^2$
- C  $8\pi$
- D  $8\pi^2$

15 On a winter Monday in Prescott, the temperature at 8 a.m. was  $-8^\circ\text{F}$ . At 1 p.m. it was  $27^\circ\text{F}$ . By how many degrees did the temperature change from morning to afternoon?

- A  $-35^\circ$
- B  $-19^\circ$
- C  $19^\circ$
- D  $35^\circ$

16 Dave's neighbors are going on a trip to Japan. He wants them to bring him a souvenir t-shirt, but Japan has its own unit of currency.

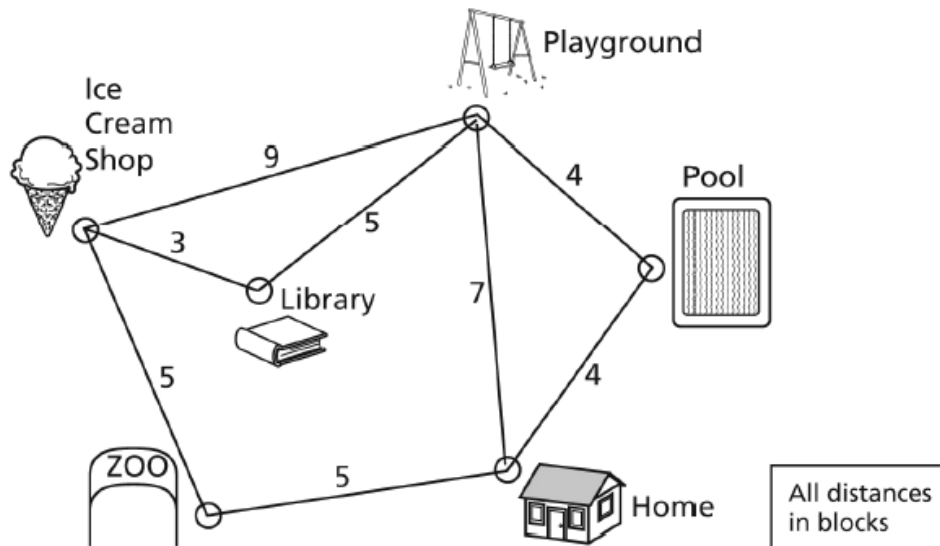
**Conversion**

**1 US dollar = about 94.73 Japanese yen**

Dave gives his neighbors \$20.00. About how many Japanese yen will Dave's neighbors be able to spend on his t-shirt?

- A 1
- B 5
- C 95
- D 1895

**17** Karen wants to visit all of the points of interest near her home. She will leave from her home and then visit each place on her vertex-edge graph only once.



What is the shortest distance that Karen will travel to each site and then return home?

- A 21 blocks
- B 25 blocks
- C 26 blocks
- D 27 blocks

**18** Ken will conduct a probability experiment by removing a cube from a bag of colored cubes that are all the same size and shape. Ken will use the following procedure.

- Without looking, remove a cube.
- Record its color.
- Put it back in the bag.
- Repeat the experiment.

The probability of drawing a green cube is  $\frac{1}{2}$ . What is the probability that the first 3 cubes that Ken removes will be green?

- A  $\frac{1}{8}$
- B  $\frac{1}{4}$
- C  $\frac{3}{8}$
- D  $\frac{3}{2}$

**Go On ►**



**19** Alfredo bought 3 new notebooks for school. He paid \$2.49 for all the notebooks. Which equation can be used to find  $n$ , the cost of each notebook?

- A  $3n = 2.49$
- B  $2.49n = 3$
- C  $2.49 + n = 3$
- D  $3 + n = 2.49$

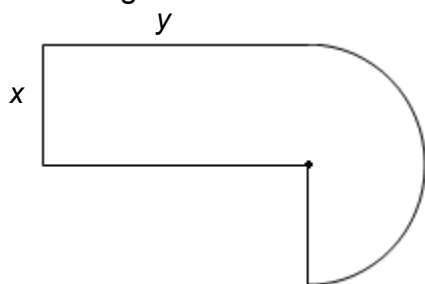
**20** The table shows a sequence of numbers.

$-\frac{1}{3}$	1	-3	9	-27	...
----------------	---	----	---	-----	-----

What is the rule for the sequence?

- A multiply the preceding term by 3
- B divide the preceding term by 3
- C multiply the preceding term by  $-3$
- D divide the preceding term by  $-3$

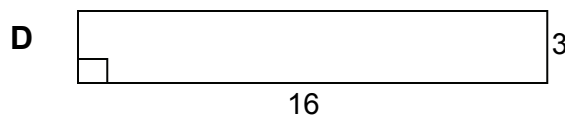
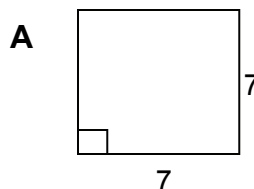
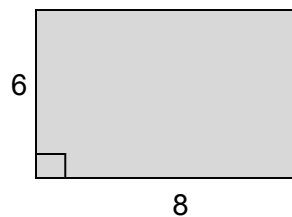
**21** Look at the figure.



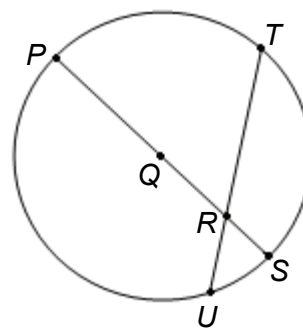
Which statement can be used to find the total area of the figure?

- A find  $x$  multiplied by  $y$ , then add to  $x^2\pi$
- B find  $2x$  multiplied by  $y$ , then add to  $x^2\pi$
- C find  $x$  multiplied by  $y$ , then add that to  $\frac{x^2\pi}{2}$
- D find  $2x$  multiplied by  $y$ , then add that to  $\frac{x^2\pi}{2}$

**22** Which polygon has the same perimeter as the one below?



**23** Which two points on circle Q form an arc?



- A Q and R
- B R and S
- C S and T
- D T and R

**24** What is the value of the expression?

$$|-3 + (-9)|$$

- A -12
- B -6
- C 6
- D 12

**25** What is the solution to the equation?

$$\frac{12(-3) + 4}{4} =$$

- A -36
- B -8
- C 3
- D 8

**26** What is  $7.29 \times 10^5$  written in standard form?

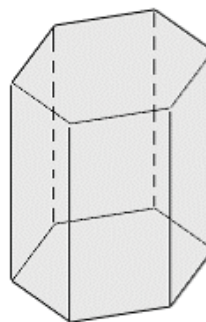
- A 0.00000729
- B 0.0000729
- C 729,000
- D 72,900,000

**27** Which pair of events is dependent?

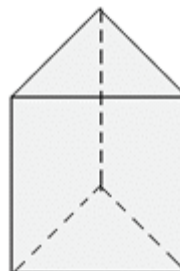
- A flipping a coin, then flip it again
- B rolling a fair cube, then rolling it again
- C spinning the arrow of a spinner, then rolling a fair cube
- D removing a card from a deck, then removing another one

**28** Which figure is a right prism with a hexagonal base?

A



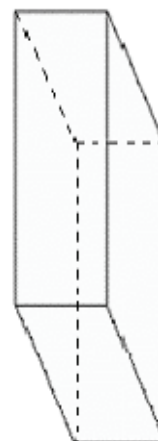
B



C



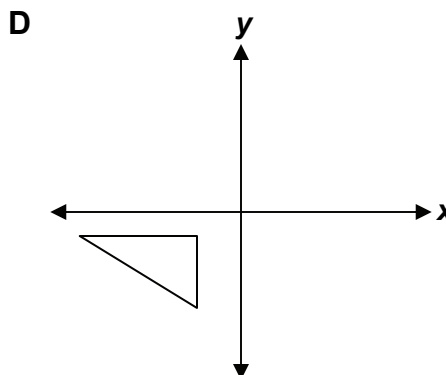
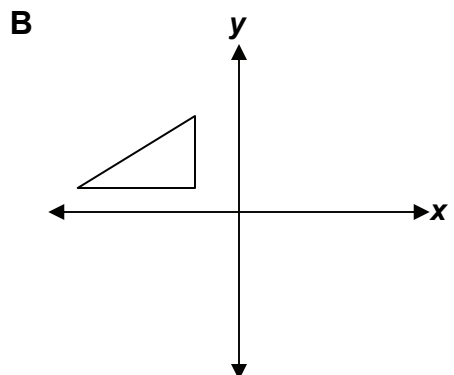
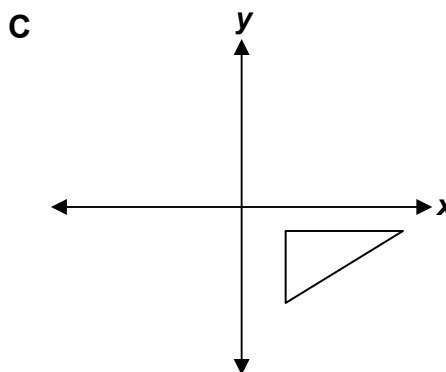
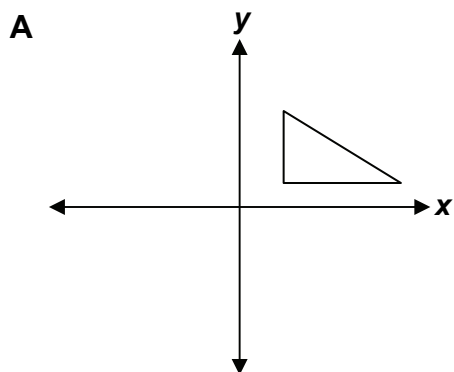
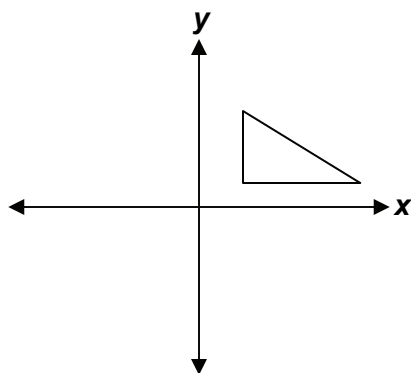
D



**29** Ramon wants to graph his science test scores each week. He will use the graph to determine a trend for his scores based on the days of the week he takes the test. What is the **best** type of graphic display he should use for this?

- A line graph
- B histogram
- C circle graph
- D stem-and-leaf plot

**30** Which figure shows the triangle below reflected over the  $x$ -axis, then reflected over the  $y$ -axis?



**Go On** ►

**31** Which table of values can be used to graph the equation below?

$$y = 2x + 1$$

**A**

<b>x</b>	0	1	2	3	4
<b>y</b>	1	3	5	7	9

**B**

<b>x</b>	-2	-1	0	1	2
<b>y</b>	5	3	1	-3	-5

**C**

<b>x</b>	-2	-1	0	1	2
<b>y</b>	-5	-1	1	3	5

**D**

<b>x</b>	0	1	2	3	4
<b>y</b>	0	1	2	3	4

**32** Jose is having a party and will invite all of his friends. He will supply the following items for each person.

- 3 slices of pizza
- 2 bottles of sports drink
- 1 piece of cake

What information is needed to make sure that Jose has pizza, sports drink, and cake for each person?

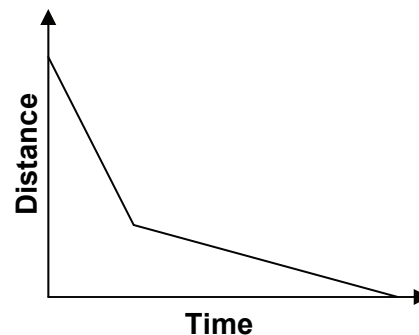
- A** How much is the cake?
- B** How much is each pizza?
- C** How many people like sports drink?
- D** How many people will be at the party?

**33** What is the solution to the equation?

$$\frac{7}{2}x - 2 = 28 - 4x$$

- A**  $x = 0$
- B**  $x = \frac{2}{7}$
- C**  $x = 4$
- D**  $x = 7$

**34** What situation could the graph **best** represent?



- A** a kite flying in the air
- B** a tennis ball falling off a table
- C** a sky diver jumping from an airplane
- D** a bungee jumper jumping from a bridge



## AIMS Grade 7 Mathematics Sample Test Answer Key

The answer key below shows you the Strand, Concept, and Performance Objective that each item is addressing. This will help you to identify which Concepts from the AZ Academic Mathematics Standards that you may need to study more.

<b>1</b>	<b>1.2.3</b>	<b>D</b>
<b>2</b>	<b>4.1.2</b>	<b>D</b>
<b>3</b>	<b>4.4.1</b>	<b>A</b>
<b>4</b>	<b>2.1.3</b>	<b>A</b>
<b>5</b>	<b>5.2.7</b>	<b>D</b>
<b>6</b>	<b>5.2.5</b>	<b>C</b>
<b>7</b>	<b>2.3.2</b>	<b>B</b>
<b>8</b>	<b>3.3.2</b>	<b>C</b>
<b>9</b>	<b>3.4.1</b>	<b>C</b>
<b>10</b>	<b>5.2.9</b>	<b>B</b>
<b>11</b>	<b>1.2.1</b>	<b>C</b>
<b>12</b>	<b>1.3.3</b>	<b>B</b>
<b>13</b>	<b>2.2.1</b>	<b>C</b>
<b>14</b>	<b>4.4.1</b>	<b>C</b>
<b>15</b>	<b>1.1.4</b>	<b>D</b>
<b>16</b>	<b>1.3.4</b>	<b>D</b>
<b>17</b>	<b>2.4.1</b>	<b>C</b>

<b>18</b>	<b>2.2.1</b>	<b>A</b>
<b>19</b>	<b>3.3.1</b>	<b>A</b>
<b>20</b>	<b>3.1.1</b>	<b>C</b>
<b>21</b>	<b>5.1.1</b>	<b>C</b>
<b>22</b>	<b>4.4.2</b>	<b>A</b>
<b>23</b>	<b>4.1.1</b>	<b>C</b>
<b>24</b>	<b>1.1.4</b>	<b>D</b>
<b>25</b>	<b>1.2.1</b>	<b>B</b>
<b>26</b>	<b>1.2.4</b>	<b>C</b>
<b>27</b>	<b>2.2.2</b>	<b>D</b>
<b>28</b>	<b>4.1.3</b>	<b>A</b>
<b>29</b>	<b>2.1.1</b>	<b>A</b>
<b>30</b>	<b>4.2.1</b>	<b>D</b>
<b>31</b>	<b>3.2.1</b>	<b>A</b>
<b>32</b>	<b>5.2.3</b>	<b>D</b>
<b>33</b>	<b>3.3.3</b>	<b>C</b>
<b>34</b>	<b>3.4.1</b>	<b>C</b>

## AIMS Grade 7 Mathematics Think-Throughs & Practice Applications

The problems on the following pages are from the sample test you just finished. They have been worked out for you to show the thought process behind finding the answers.

As you go through them, see how your thoughts compare to the ones given. Not every problem from the sample test will be shown in this same manner.

The number for each problem matches the same number that it is in the sample test. This way, if you got the problem incorrect you can compare your answers and go back to see what you may have done differently.

Then, after each Think-Through problem, you will find two more problems to apply what you just learned from the Think-Through problems. These will be very similar to the Think-Through problem. They are also testing the same academic performance objective. This will give you even more practice to think through your own problem solving process.

As you read through the solution process of the problems, you may notice that some of the words are *italicized*. This indicates some mathematics terms that would be helpful to know.

After the two application problems, there will be a Summary Statement which explains the basic concept that the problems are testing. This will help you to understand which concepts you may need more work on or which concepts you may have mastered.

- 1 A microwave oven is on sale for 20% off the regular price. The sale price is \$250.00. What is the regular price of the microwave oven?
- A \$166.67  
 B \$200.00  
 C \$300.00  
 D \$312.50

It looks like this question is asking me to find the regular price of the microwave oven. That means the price that it was before it went on sale. First I will identify the important information that I get from the problem.

- original price is unknown
- discount is 20% off
- sale price \$250

Because the original price is unknown and that is what I am trying to find, I will call it  $x$ .

As I read each of the parts of the problem that I know, I am going to turn the words into an equation. That will then help me to solve for the original price, or  $x$ .

**The original price minus the discount (20% of original price) is \$250.**

$$x - .20(x) = 250$$

I changed 20% to the decimal form of .20 because that is standard when writing an equation.

Now that I have created an equation, I can solve for  $x$ .

The first thing I need to do is to combine like terms.

$$x - .20x = 250$$

One whole  $x$  minus a  $.20x$  is  $.80x$ .

$$.80x = 250$$

Now I need to get  $x$  by itself. I will do the inverse operation. Since  $x$  is multiplied by  $.80$ , I will divide by  $.80$ . And, what I do to one side of the equals sign, I need to do to the other.

$$\frac{.80x}{.80} = \frac{250}{.80}$$

Once I do that, I get that  $x$  is 250 divided by  $.80$ .

$$x = 312.50$$

That means that  $x$ , the original price of the microwave oven, is \$312.50, or answer choice **D**.

**1a** A music player is on sale for 15% off of the original price. The sale price is \$170.00. What is the regular price of the music player?

- A \$144.50
- B \$195.50
- C \$200.00
- D \$221.00

**1b** Joe bought his skateboard for \$80.00. He saw the same skateboard at another store for \$100.00. What is the percent discount that Joe received on his skateboard?

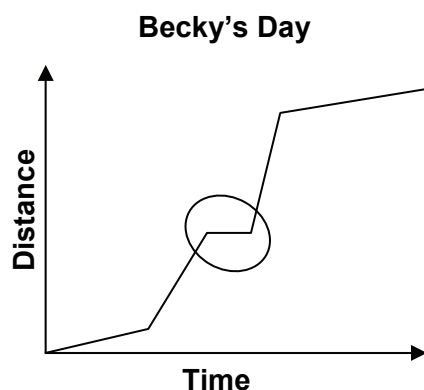
- A 20%
- B 25%
- C 75%
- D 80%

**Summary Statement:**

These problems involve solving for percentages and ratio and proportion, including tax, discount, tips, and part/whole relationships.



- 5 Becky created the line graph below to show the distance she traveled during one day.



Which activity could be represented by the circled portion of the line?

- A driving to the park
- B walking in the park
- C driving to the library
- D studying in the library

The question is asking me to focus on the circled portion of the graph. First I want to make sure I know that the entire graph is displaying.

The graph represents Becky's day. Because it has labels with time and distance, the line must represent how long she did certain things in relation to the distance she moved during that time. For most of the graph, it looks like as time passed (the line goes to the right) Becky was moving (the lines goes up).

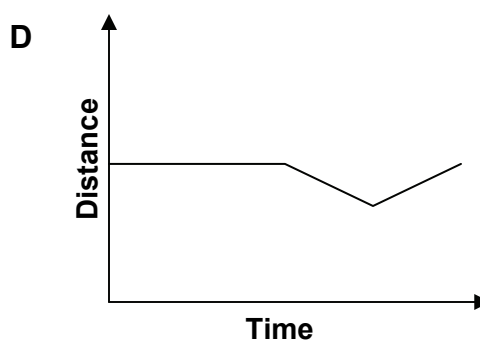
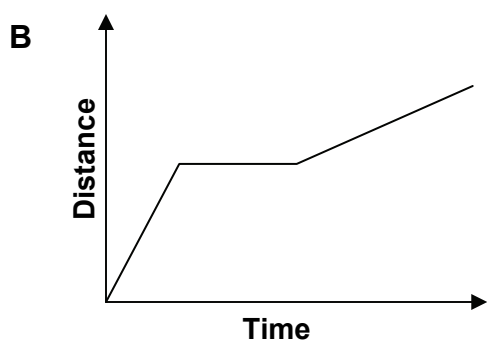
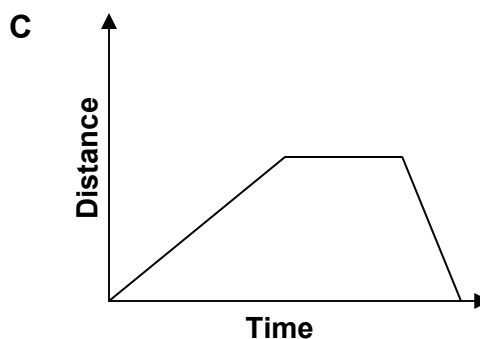
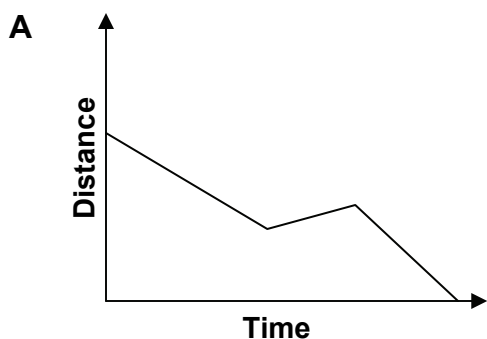
But, the problem wants me to look at the circled portion. At that spot, the line is still going to the right, which means time is passing, but the line is not moving up, which means Becky is **not** moving. Time passed (increased), but she stayed in one spot.

Now that I know what the circled part of the graph means, I can see which answer option could fit what I determined: **time increased, but distance stayed the same.**

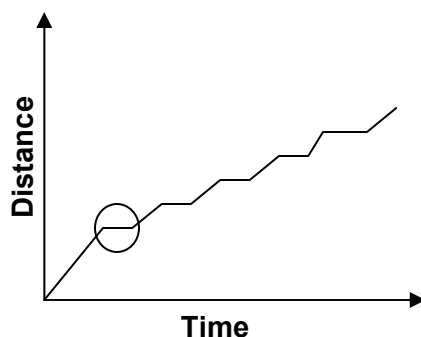
- **Choice A** driving to the park- this is incorrect it because it takes time to drive and it also takes distance to drive
- **Choice B** walking in the park- this is incorrect because it is the same as A
- **Choice C** driving to the library- this is also incorrect because driving still represents distance, and it takes time to go somewhere
- **Choice D** studying in the library- studying is done while not moving, but it takes time so time still increases. This is the best choice.

So, it looks like the best option is answer choice **D**.

**5a** Which line graph best represents running to the library, studying for a while, then walking home?



**5b** The line graph represents the distance traveled by a 7<sup>th</sup> grade student during one school day.



Which activity is most likely **not** represented by the circled portion of the line?

- A** eating lunch
- B** typing a report
- C** walking to class
- D** taking a math test

**Summary Statement:**

These problems involve isolating and organizing mathematical information taken from symbols, diagrams, and graphs in order to make inferences, draw conclusions, and justify reasoning. Students need to understand there are multiple representations for this.

- 13** Using the results in the tables, what is the probability of a spinner landing on the letter P in both experiments?

Experiment A		Experiment B	
Spin	Color	Spin	Color
1	B	1	P
2	P	2	P
3	B	3	B
4	W	4	W
5	P	5	W
6	G	6	P
7	G	7	G
8	P	8	P
9	W	9	W
10	B	10	B

- A**  $\frac{3}{10}$
- B**  $\frac{2}{5}$
- C**  $\frac{3}{25}$
- D**  $\frac{7}{20}$

*Probability.* I know I have heard this before. *Probability* is how likely it is that something will happen based on the possible outcomes.

The results in the tables show me that there were two experiments. In each experiment, someone spun a spinner 10 times and recorded the results. I need to find the *probability* of the spinner landing on the letter P.

When I look at the tables, I see that...

**In Experiment A, the spinner landed on P 3 out of 10 spins, or  $\frac{3}{10}$ .**

Experiment A

Spin	Color
1	B
2	P
3	B
4	W
5	P
6	G
7	G
8	P
9	W
10	B

**in Experiment B, the spinner landed on P 4 out of 10 spins, or  $\frac{4}{10}$ .**

Experiment B

Spin	Color
1	P
2	P
3	B
4	W
5	W
6	P
7	G
8	P
9	W
10	B

(continued on page 20)

So now I know the *probability* of landing on P for each experiment. For A, it is  $\frac{3}{10}$ . For B, it is  $\frac{4}{10}$ . But the question is asking me to find the *probability* of landing on P for **both** experiments.

At first I thought I would just add together the total number of spins, which would be 20. But that is **not** correct. Each experiment is individual. They cannot be treated as one big experiment. They are *independent* from each other.

I remember that when I am trying to find the *probability* of more than one experiment, this is the *compound probability*. To find the compound probability, I need to multiply the *probability* of one experiment by the *probability* of the other experiments.

$$\text{Compound Probability} = \text{Probability (A)} \cdot \text{Probability of (B)}$$

$$\text{or } P(\text{A and B}) = P(\text{A}) \cdot P(\text{B})$$

$$P(\text{A}) = \frac{3}{10} \quad \text{and} \quad P(\text{B}) = \frac{4}{10}$$

$$\frac{3}{10} \cdot \frac{4}{10} = \frac{12}{100}$$

This can be reduced. Each number has greatest common factor of 4.

$$\frac{12 \div 4}{100 \div 4} = \frac{3}{25}$$

$$P(\text{A and B}) = \frac{3}{25}$$

So, the probability for both experiments of the spinner landing on P is  $\frac{3}{25}$ , or 3 out of 25 times. This is answer choice **C**.

- 13a** Using the results in the tables, what is the probability of a spinner landing on the letter P in Experiment A and a spinner landing on the letter G in Experiment B?

**Experiment  
A**

Spin	Color
1	B
2	P
3	B
4	W
5	P
6	G
7	G
8	P
9	W
10	B

**Experiment  
B**

Spin	Color
1	P
2	P
3	B
4	W
5	W
6	P
7	G
8	P
9	W
10	B

- A**  $\frac{1}{10}$
- B**  $\frac{3}{10}$
- C**  $\frac{1}{5}$
- D**  $\frac{3}{100}$

- 13b** Using the results in the tables, what is the probability of a spinner landing on the letter W in both experiments?

**Experiment  
A**

Spin	Color
1	B
2	P
3	B
4	W
5	P
6	G
7	G
8	P
9	W
10	B

**Experiment  
B**

Spin	Color
1	P
2	P
3	B
4	W
5	W
6	P
7	G
8	P
9	W
10	B

- A**  $\frac{1}{5}$
- B**  $\frac{3}{10}$
- C**  $\frac{3}{50}$
- D**  $\frac{1}{4}$

**Summary Statement:**

These problems involve determining conditional probabilities (experimental) in compound probability experiments. Conditional probability is limited to situations with and without replacement. This builds upon prior knowledge of determining outcomes of sample space.

- 16** Dave's neighbors are going on a trip to Japan. He wants them to bring him back a souvenir t-shirt, but Japan has its own unit of currency.

**Conversion**

**1 US dollar = about 94.73 Japanese yen**

Dave gives his neighbors \$20.00. About how many Japanese yen will Dave's neighbors be able to spend on his t-shirt?

- A** 1  
**B** 5  
**C** 95  
**D** 1895

This question is asking me to convert money from US dollars to Japanese yen. I do not think I have even heard of yen before, but that is okay. The conversion rate is given to me in the problem.

It states that 1 US dollar is equal to about 94.73 Japanese Yen. So, if I know this, I should be able to figure out any amount of money.

First I will make a proportion for the number of US dollars to Japanese yen. Since the question asks me "about how many," I will round 94.73 to 95.

$$\frac{1}{95} \quad \begin{array}{l} \text{US dollar} \\ \text{yen} \end{array}$$

Then, I will make the proportion for what I need to find, 20 US dollars is to x number of yen. I will set up the proportion in the same way as my first proportion, with the US dollars in the numerator and the Japanese yen in the denominator.

$$\frac{20}{x} \quad \begin{array}{l} \text{US dollars} \\ \text{yen} \end{array}$$

Now I can set these proportions equal to each other.

$$\frac{1}{95} = \frac{20}{x}$$

And I cross-multiply to solve for x.

$$\frac{1}{95} = \frac{20}{x}$$

$$1 \cdot x = 95 \cdot 20$$

When I do this, I get that  $x = 1900$ , or that there about 1900 Japanese yen in \$20.00. Since I rounded originally, the closest answer is **D**.

$$x = 1900$$

- 16a** Al traveled to France on vacation. He wants to buy lunch at a café. He has \$30.00 in US money, but in France they use the euro. About how many euro can Al spend on his lunch?

**Conversion**  
**1 US dollar = about 0.69 euro**

- A** 1
- B** 18
- C** 21
- D** 60

- 16b** Fred is planning a trip with his family to Mexico. He will take with him \$50.00 to buy gifts for his friends at school. In Mexico, the unit of money is a peso. About how many pesos can he spend on gifts for his friends?

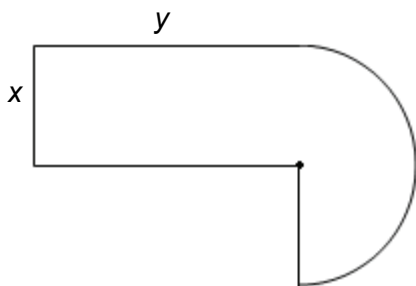
**Conversion**  
**1 US dollar = about 13.25 pesos**

- A** 700
- B** 650
- C** 100
- D** 14

**Summary Statement:**

These problems involve estimating the measure of an object in one system of units given the measure of that object in another system and the approximate conversion factor. Conversions should focus on commonly used values and contexts which are meaningful.

- 21** Look at the figure.



Which statement can be used to find the total area of the figure?

- A** find  $x$  multiplied by  $y$ , then add to  $x^2\pi$
- B** find  $2x$  multiplied by  $y$ , then add to  $x^2\pi$
- C** find  $x$  multiplied by  $y$ , then add that to  $\frac{x^2\pi}{2}$
- D** find  $2x$  multiplied by  $y$ , then add that to  $\frac{x^2\pi}{2}$

The question is asking me which statement can be used to find the total area of the figure. So, I am not finding the area but deciding the process that I can use to find the total area. I am figuring out the process rather than the solution.

The figure is kind of an odd shape, but when I really look at it, it is simply a rectangle and a semi-circle.

So, it seems like to find the area of the entire shape, I need to find the area of the rectangle and add that to the area of the semi-circle.

I can use the Grade 7 AIMS Reference Sheet to find the formulas for area.

Name	Notation	Circumference (C) Perimeter (P)	Area (A)
Circle	$r$ = radius $d$ = diameter	$C = \pi d$ or $C = 2\pi r$	$A = \pi r^2$
Parallelogram	$a, b$ = sides $h$ = height	$P = 2(a + b)$	$A = bh$
Rectangle	$l$ = length $w$ = width	$P = 2(l + w)$	$A = lw$

Now I can find the area for each figure to get the total area.

(continued on page 25)



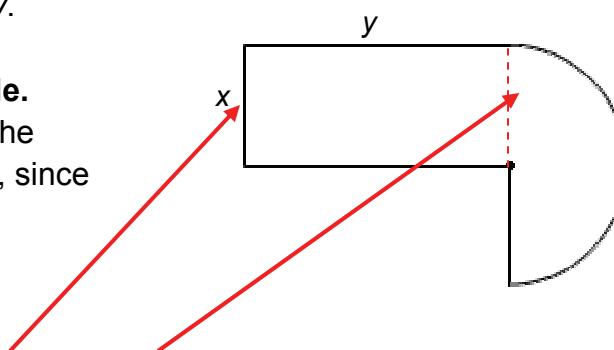
**First, I will find the area of the rectangle.**

I multiply the length times the width, or  $x \cdot y$ .

**Next, I will find the area of the semi-circle.**

To find the area of a semi-circle, I will use the formula for the area of a circle divided by 2, since a semi-circle is half of a circle.

This is written as  $\frac{\pi r^2}{2}$ .



In the figure, I do not see a value for the radius of the circle, but since I do see that the **length of the rectangle** is the same as the **radius of the circle**, I will use  $x$  in place of  $r$  in the equation.

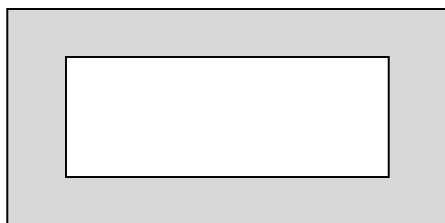
**Lastly, I will find the total area.**

I do this by adding the area of the rectangle to the area of the semi-circle.

The total area of the figure is  $x$  multiplied by  $y$ , plus  $\frac{\pi r^2}{2}$ .

When I look at the answer choices, I see that answer choice **C** matches the process that I created.

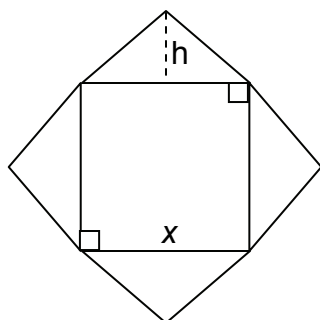
**21a** Look at the figure.



Which process would **not** be used to find the area of the shaded portion of the figure?

- A** Add the area of the smaller rectangle to the area of the larger rectangle.
- B** Find the area of the large rectangle and subtract the area of the smaller rectangle.
- C** Create four rectangles from the shaded portion of the figure and add all the areas together.
- D** Connect the corners of the inner to the outer rectangle creating diagonals, and find the area of the four trapezoids created from them.

**21b** Look at the figure.



Which process can be used to find the total area of the figure?

- A** find  $x^2$  and multiply that by 3
- B** multiply one-half of  $x$  by  $h$  and add that to  $x^2$
- C** find  $x^2$  and add that to two times  $x$  multiplied by  $h$
- D** multiply  $x$  by  $h$  and then multiply that answer by 2

**Summary Statement:**

These problems involve creating algorithms to determine the area of a given composite figure. Algorithms are step-by-step instructions for completing a task that can be generalized to other tasks, problems, or situations.

**25** What is the solution to the equation?

$$\frac{12(-3) + 4}{4} =$$

- A** -36
- B** -8
- C** 3
- D** 8

Since the question is asking what the solution to the equation is, I know that I need to simplify whatever I can first, then that will help me to find the solution to this complex fraction.

In order to solve this equation correctly, I have to think of the numerator as a group and the denominator as a group. Then, I need to use the proper order of operations: **parentheses, exponents, multiplication, division, addition, subtraction**.

First I will carry out what is in the numerator.  
I will carry out the multiplication, or the parentheses.

$$\frac{12(-3) + 4}{4} =$$

Next, I will finish the operations for the numerator.

$$\frac{-36 + 4}{4} =$$

After that, I am left with a fraction that looks like it can be reduced.

$$\frac{-32}{4} =$$

The solution to the equation is  $-8$ , or answer choice **B**.

$$\frac{-32}{4} = -8$$

**25a** What is the solution to the equation?

$$\frac{12(-3) - 4}{-2} =$$

- A -22
- B -20
- C 16
- D 20

**25b** What is the solution to the equation?

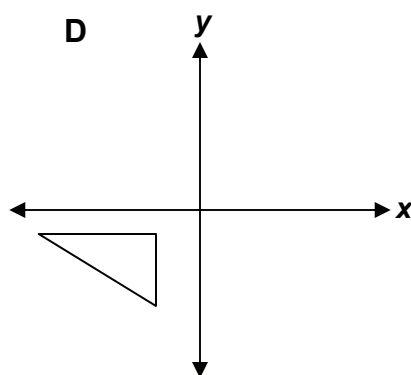
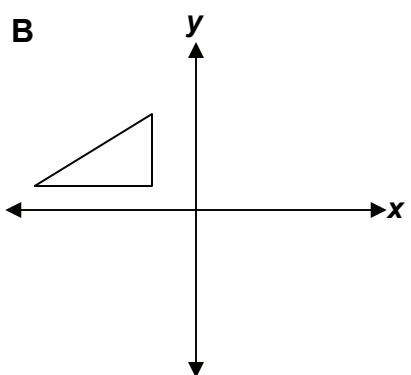
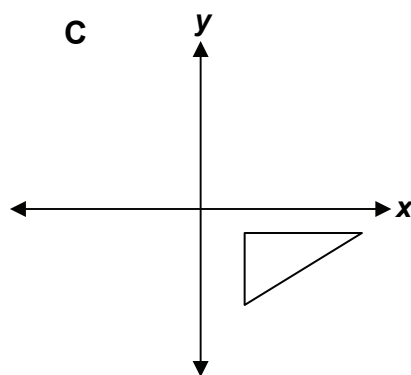
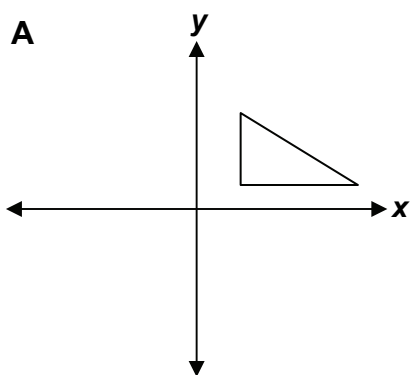
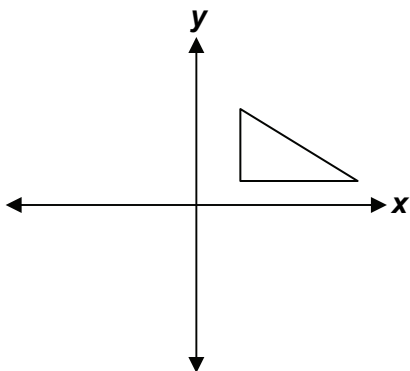
$$\frac{-8(-4) + (-6)}{2} =$$

- A -19
- B -13
- C 13
- D 19

**Summary Statement:**

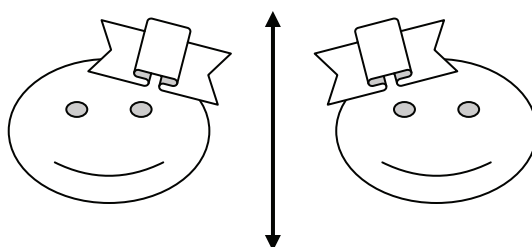
These problems involve adding, subtracting, multiplying, and dividing integers. They also show the connections among the operations

**30** Which figure shows the triangle below reflected over the  $x$ -axis, then reflected over the  $y$ -axis?



I am to decide which figure shows a *reflection* of the triangle over the  $x$ -axis and then again over the  $y$ -axis.

First, I remember that a *reflection* is the mirror image of the object over a designated line, and the reflection is the same distance from the point of reflection as the original.

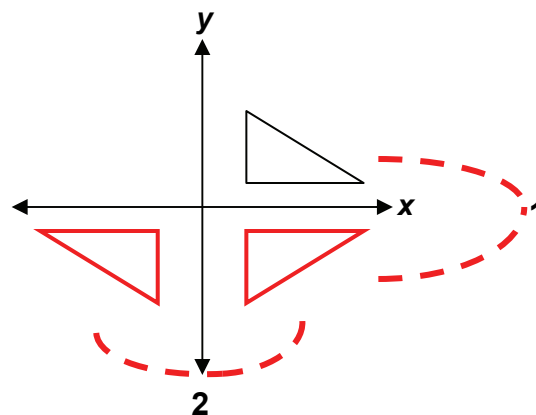


(continued on page 30)

The  $x$ -axis is the horizontal line labeled  $x$ , and the  $y$ -axis is the vertical line labeled  $y$ .

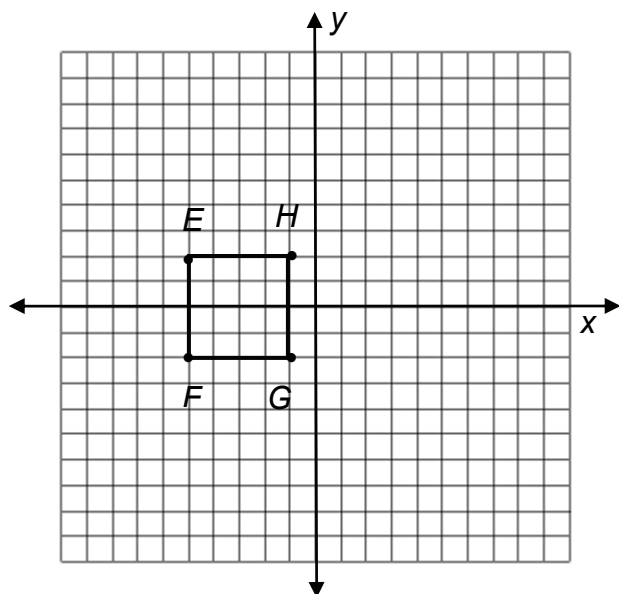
So now that I understand what the question is asking, I can work through it.

1. Reflect the triangle over the  $x$ -axis.
2. Then, from its new position, reflect the triangle over the  $y$ -axis.



It looks like my image matches answer choice **D**, as it is the only image with the triangle first reflected over the  $x$ -axis first and then the  $y$ -axis.

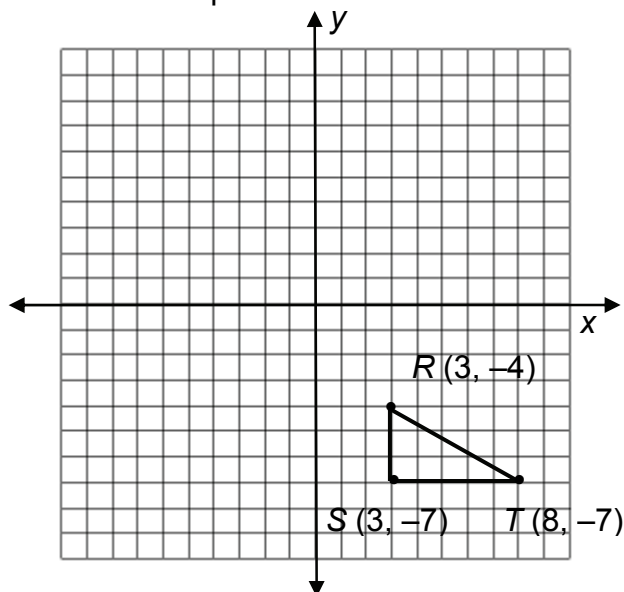
- 30a** Figure  $EFGH$  in the coordinate plane has vertices at  $(-5, 2)$ ,  $(-5, -2)$ ,  $(-1, -2)$ , and  $(-1, 2)$ .



If the figure is translated 5 units to the right and 2 units up, what are the coordinates of the  $E'F'G'H'$ ?

- A  $(0, 4)$ ,  $(0, 0)$ ,  $(4, 0)$ ,  $(4, 4)$
- B  $(-3, 7)$ ,  $(-3, 3)$ ,  $(1, 3)$ ,  $(1, 7)$
- C  $(-10, 0)$ ,  $(-10, 4)$ ,  $(-6, -4)$ ,  $(-6, 0)$
- D  $(-7, -3)$ ,  $(-7, -7)$ ,  $(-3, -7)$ ,  $(-3, -3)$

- 30b** Triangle  $RST$  is shown in the coordinate plane.



What are the coordinates of  $R''S''T''$  if the figure is reflected over the  $x$ -axis and translated down two units?

- A  $(1, -6)$ ,  $(1, -9)$ ,  $(6, -9)$
- B  $(3, 4)$ ,  $(3, 7)$ ,  $(8, 7)$
- C  $(1, 2)$ ,  $(1, 5)$ ,  $(6, 5)$
- D  $(3, 2)$ ,  $(3, 5)$ ,  $(8, 5)$

**Summary Statement:**

These problems model the result of a double transformation (translations or reflections) of a 2-dimensional figure on a coordinate plane using all four quadrants.

**33** What is the solution to the equation?

$$\frac{7}{2}x - 2 = 28 - 4x$$

- A**  $x = 0$   
**B**  $x = \frac{2}{7}$   
**C**  $x = 4$   
**D**  $x = 7$

This problem wants me to find the solution. And, since I see an  $x$ , that means the solution is going to be the value for  $x$ . It looks like the first thing I need to do is to simplify the terms that I do have.

I will combine like terms so that I have the  $x$  terms on one side of the equals sign, and the rest of the numbers on the other. In order to do that, I need to perform the inverse operation for each term that I am trying to combine.

$$\frac{7x}{2} - 2 = 28 - 4x$$

$$\frac{7x}{2} - 2 = 28 - 4x$$

I get the numbers on one side and all the terms with  $x$  on the other side.

$$\frac{7x}{2} = 30 - 4x$$

After I finish with those steps, I see that in order to combine the  $x$  terms, I need to find a common denominator. I know that 2 is an easy common denominator for many numbers. I can create a new fraction for  $4x$  just by multiplying it by 2. Now I can add the two  $x$  terms together.

$$\frac{7x}{2} + 4x = 30$$

$$\frac{7x}{2} + \frac{8x}{2} = 30$$

I still have to get rid of the  $\frac{1}{2}$  on the side with the  $x$  term. I will again perform the inverse operation and multiply each side by 2.

$$\frac{15x}{2} = 30$$

$$2 \cdot \frac{15x}{2} = 30 \cdot 2$$

Finally, to get  $x$  by itself I divide each side by 15, and get 4, which is answer choice **C**.

$$\frac{15x}{15} = \frac{60}{15} \quad x = 4$$



**33a** What is the solution to the equation?

$$\frac{3}{4}x - 4 = 40 - 2x$$

- A**  $x = -121$
- B**  $x = -16$
- C**  $x = 16$
- D**  $x = 121$

**33b** What is the solution to the equation?

$$3y - 7 = 2y - 0.5$$

- A**  $y = 0$
- B**  $y = 1$
- C**  $y = 6.5$
- D**  $y = 7.5$

**Summary Statement:**

These problems involve solving multi-step equations using inverse operations with rational numbers.

## AIMS Grade 7 Mathematics Practice Applications Answer Key

The answer key below is for the Practice Applications. Included is the Strand, Concept, and Performance Objective that each item is addressing. This will help you to identify which Concepts from the AZ Academic Mathematics Standards that you may need to study more.

### Practice Applications Answer Key

<b>Number</b>	1	5	13	16	21	25	30	33
<b>PO</b>	1.2.3	5.2.7	2.2.1	1.3.4	5.1.1	1.2.1	4.2.1	3.3.3
<b>a</b>	C	B	D	C	A	D	A	C
<b>b</b>	A	C	C	B	C	C	D	C

## Grade 7 AIMS Reference Sheet

The next page contains the reference sheet that is on the AIMS assessment. You can use it when you need formulas in order to solve equations. You can also use it to find other information that may help when problem solving.

The Arizona Department of Education recommends that you also use the Grade 7 AIMS Reference Sheet throughout the school year. This will allow you time to become familiar with its content and format before taking AIMS.

Your teachers can identify the formulas that may be written differently from those printed in your classroom resources and explain to you in more detail how they are organized on the sheet.

Each area of the Reference Sheet is labeled for the particular area of mathematics that it belongs to. For instance, if you are working on a problem that involves finding the circumference of a circle, you would look in the section labeled *Plane Figures: Perimeters and Area*.

### Plane Figures: Perimeters and Area

Name	Notation	Circumference (C) Perimeter (P)	Area (A)
Circle	$r = \text{radius}$ $d = \text{diameter}$	$C = \pi d$ or $C = 2\pi r$	$A = \pi r^2$
Parallelogram	$a, b = \text{sides}$ $h = \text{height}$	$P = 2(a + b)$	$A = bh$

Once you find the appropriate section, you can look under each subtitle for the correct formula.

Not all problems on AIMS will require the use of formulas, but in case you do need one, these sheets are here for you to use.

# Grade 7 AIMS Reference Sheet

Use 3.14 or  $\frac{22}{7}$  for  $\pi$ .

## Plane Figures: Perimeters and Areas

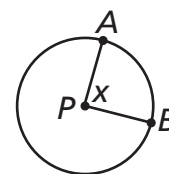
Name	Notation	Circumference (C) Perimeter (P)	Area (A)
Circle	$r$ = radius $d$ = diameter	$C = \pi d$ or $C = 2\pi r$	$A = \pi r^2$
Parallelogram	$a, b$ = sides $h$ = height	$P = 2(a + b)$	$A = bh$
Rectangle	$l$ = length $w$ = width	$P = 2(l + w)$	$A = lw$
Trapezoid	$a, b, c, d$ = sides $b_1$ = long base $b_2$ = short base $h$ = height	$P = a + b + c + d$	$A = \frac{1}{2}h(b_1 + b_2)$
Triangle	$a, b, c$ = sides $h$ = height	$P = a + b + c$	$A = \frac{1}{2}bh$ or $A = \frac{bh}{2}$

## Geometric Solids: Volumes

Name	Notation	Volume (V)
Rectangular Prism	$l$ = length $w$ = width $h$ = height	$V = lwh$
Right Cylinder	$r$ = radius $h$ = height	$V = \pi r^2 h$

## Angle Formulas

Central Angle Formula:

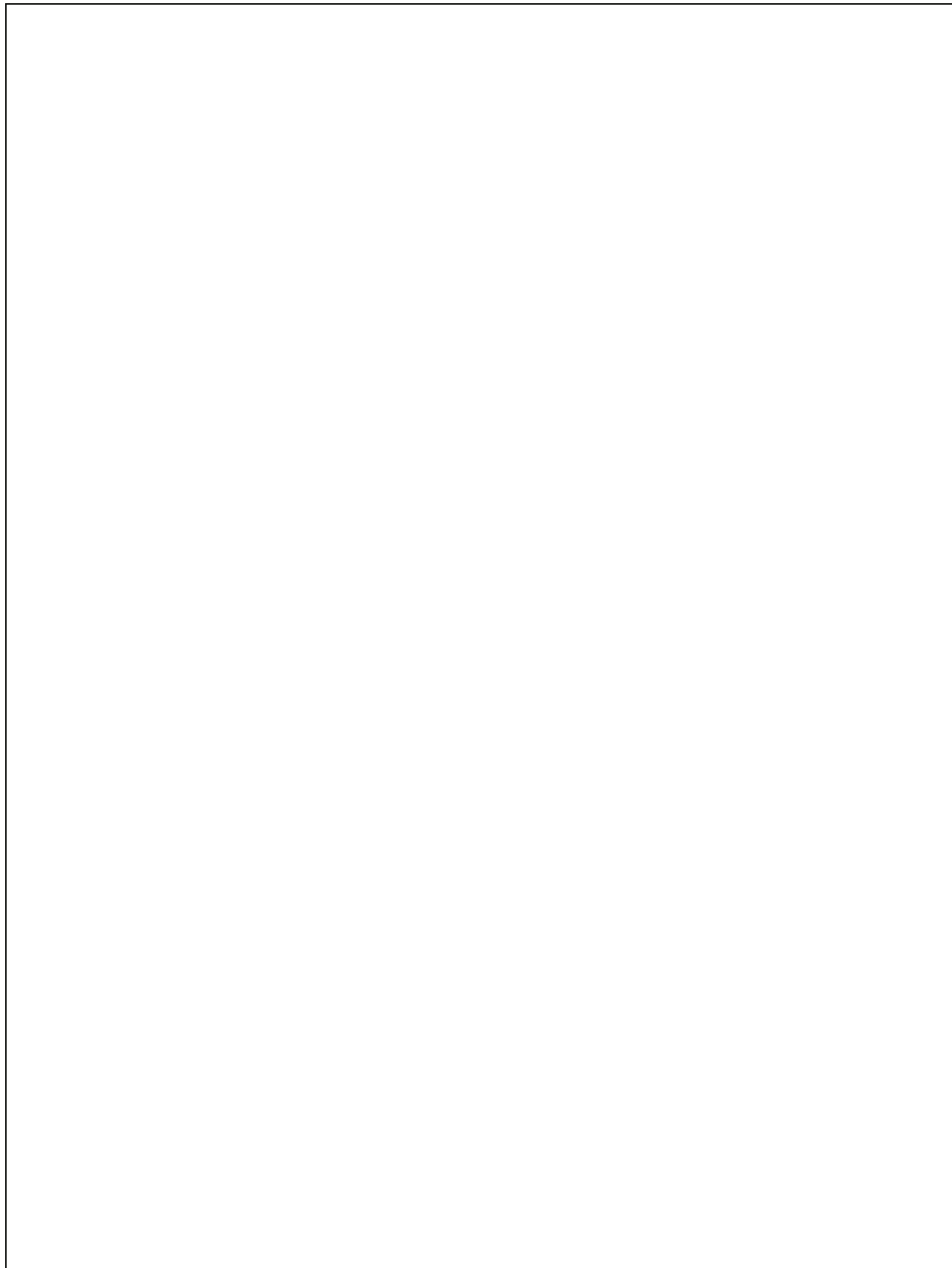


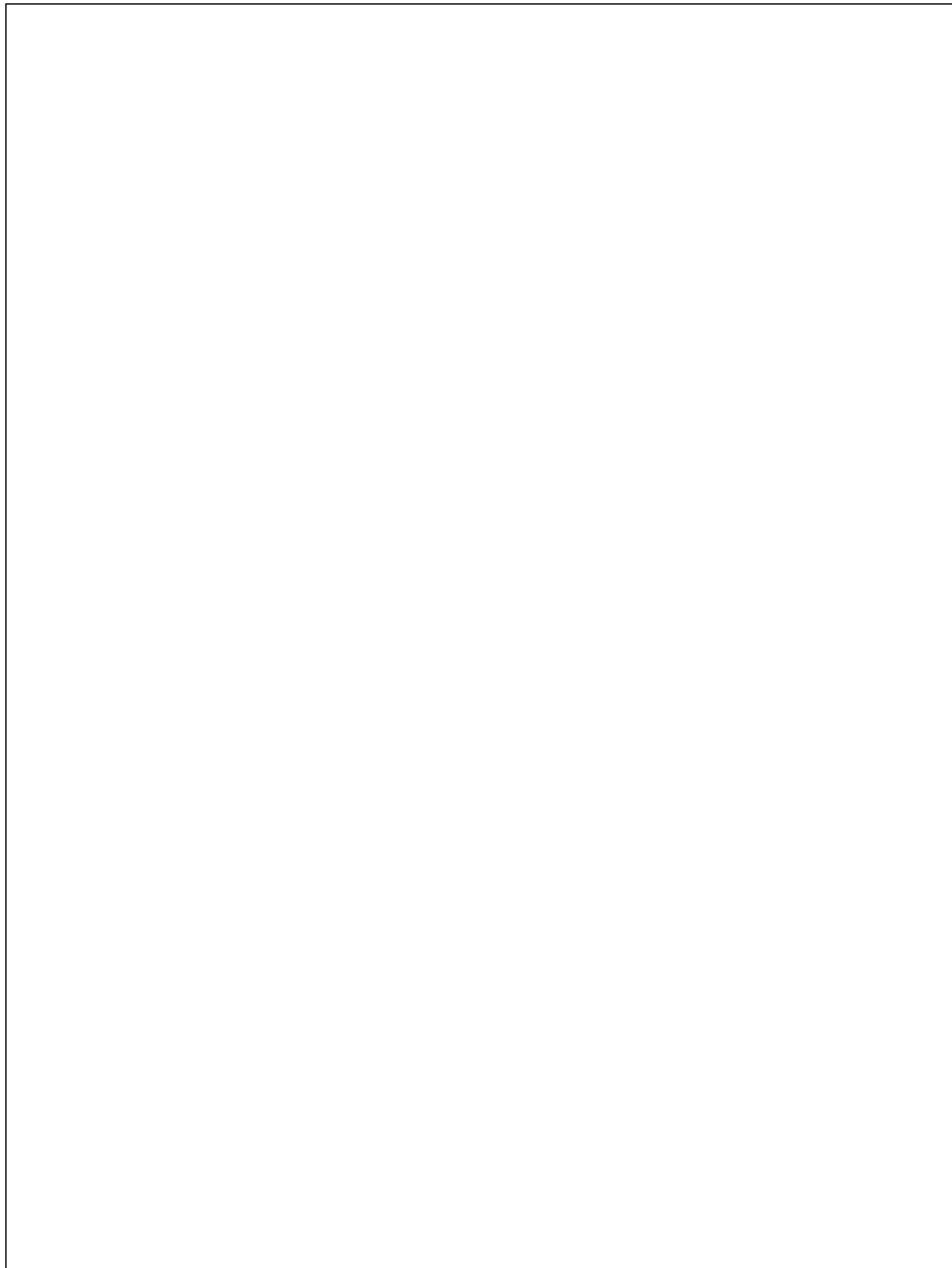
$$m\angle x = m\widehat{AB}$$

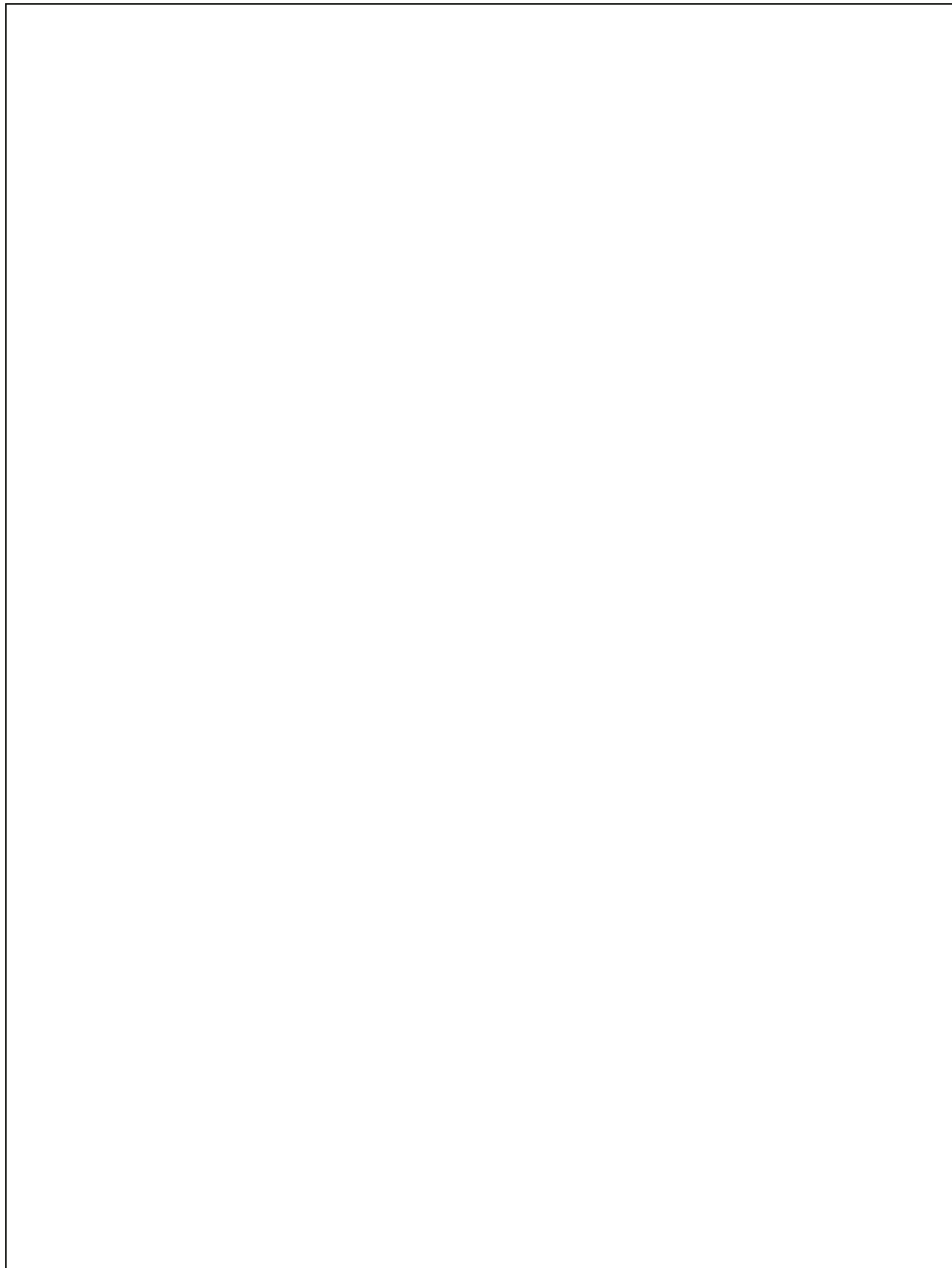
where  $P$  is the center of the circle.

Sum of the measures of the interior angles of a convex polygon with  $n$  sides:

$$S = (n - 2)(180^\circ)$$







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