



# LAFD

Written Test  
Preparation

# Guidelines for this Facility

- Parking
- Restrooms
- NO Food & Drink
- NO Coffee
- Water
- Silence Cell Phones

# TABLE OF CONTENTS

- Overview of Written Test
- Written Test Format
  - Test Type
  - Test Content
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# WRITTEN TEST FORMAT

- **Time Allowance**

- 2 ½ hours

- **Written Test Weight**

- Qualifying

- **Type of Test**

- 100 Multiple-Choice Questions
- Passing score is valid for this examination



The **QUALIFYING WRITTEN TEST** consists of multiple-choice questions, which measure:

- A) reading comprehension;
- B) mathematics, such as addition, subtraction, multiplication, division, ratios, and the use and conversion of decimals, fractions and percentages; and
- C) mechanical aptitude.

# Expectations...

- What this seminar is? What can you expect here?
- What this seminar is not? What you should not expect here?
  - Oral Interview Preparation
  - Physical Abilities Questions
  - Background Questions
  - Selection Process Information

# TEST CONTENT

- **Reading Comprehension**

- 40 questions

- **Mathematics**

- 40 questions

- **Mechanical Aptitude**

- 20 questions

# READING COMPREHENSION

- Ability to read, comprehend and apply detailed, complex materials of a technical or legal nature.



# SAMPLE PASSAGE

At a hazardous materials incident, personnel may enter the “hot zone” where contamination is likely to occur, for various job duties, including the need for sampling the material, cleanup, or spill control measures.

All personnel within the hot zone should wear the level of protective equipment the incident commander has determined to be appropriate. Differing levels of protection may be appropriate in the same area, depending on the specific task being performed.

# SAMPLE QUESTIONS

- 1. Who determines the level of protective equipment needed at a particular incident?**
  - a. The firefighter
  - b. The fire captain
  - c. The incident inspector
  - d. The incident commander
  
- 2. As described in the passage, personnel in a hot zone may wear different levels of protection because of their:**
  - a. Experience at hazardous materials incidents.
  - b. Level of contamination in their assigned areas.
  - c. Job assignment.
  - d. Resistance to negative effects of materials.



# SAMPLE PASSAGE

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# STRATEGIC TOOLS

- Information Retention Tips
  - Always read the questions first.
  - Be sure to understand what each question is asking.
  - Skimming can be used to identify key topics and ideas.
  - Refer to the passage again and again to find specific information.
  - For main idea questions, always reread the first and last sentences.
  - When you finish reading a passage, try to sum up everything in one sentence.
  - Remember - Carefully read each passage.



## Sample Passage #2

Most importantly, though, the highway bypass would have disastrous effects on the area's homeowners. As planned, the new road would cut directly through the middle of the Ellwood Acres subdivision. Not only would this send more cars through the neighborhood, but these cars would be traveling at much higher speeds, putting children at risk.

What is more, homeowners would have to deal with the increased noise and pollution that would result from such a heavily trafficked road. Finally, the new road would cause residential properties to depreciate. This means that families who chose to move away would have to sell their homes for far less than their current value.

**1. Where in the full article is this paragraph most likely to appear?**

- a. near the beginning
- b. near the end
- c. in the middle
- d. it could appear anywhere

**2. As used in the passage, which is the best definition for depreciate?**

- a. to diminish in popularity
- b. to decrease in value
- c. to accumulate over time
- d. to improve with age

## Sample Passage #2

**Most importantly**, though, the highway bypass would have disastrous effects on the area's homeowners. As planned, the new road would cut directly through the middle of the Ellwood Acres subdivision. Not only would this send more cars through the neighborhood, but these cars would be traveling at much higher speeds, putting children at risk.

What is more, homeowners would have to deal with the increased noise and pollution that would result from such a heavily trafficked road. **Finally**, the new road would cause residential properties to **depreciate**. This means that families who chose to move away would have to sell their homes for far less than their current value.

## The correct answer for Question 1 is **B**

The first sentence of the passage begins with “Most importantly, though.” This phrase lets us know that the author has explained other reasons earlier in the article. It also tells us that he or she has intentionally organized these reasons in order of importance, ending with the most important. Since this is the most important and presumably last reason the author is going to present, this paragraph is likely to appear near the end of the article. Therefore **(B)** is correct. The passage does not contain information to support choices **(A)**, **(C)**, and **(D)**. Therefore they are incorrect.

**1. Where in the full article is this paragraph most likely to appear?**

- a. near the beginning
- b. near the end
- c. in the middle
- d. it could appear anywhere

**2. As used in the passage, which is the best definition for depreciate?**

- a. to diminish in popularity
- b. to decrease in value
- c. to accumulate over time
- d. to improve with age

**The correct answer for Question 2 is also B**

**depreciate** (*verb*): to lower the price or estimated value of. Near the end of the passage, the author writes, “Finally, the new road would cause residential properties to depreciate. This means that families who chose to move away would have to sell their homes for far less than their current value.” Since families would be forced to sell their homes in the future for less than the current value, we can infer that the values of the homes will have gone down, or decreased. From this fact we can understand that *depreciate* means to decrease in value. Therefore **(B)** is correct. Although depreciate does mean to *diminish*, it refers specifically to price or value and not to popularity. This makes **(A)** incorrect. *Accumulate* is the opposite of decrease, so **(C)** is incorrect. The values of the homes will not *improve* with age; rather, they will decrease. This means **(D)** is incorrect.

# MATHEMATICS

- Ability to do arithmetic such as:
  - **Addition, subtraction, multiplication, division, ratios, and the use of and conversion of decimals, fractions, and percentages.**



# Word Problems - Addition

A man was carrying balloons but the wind blew 5 away. He has 6 balloons left. How many did he start with?  $5 + 6 = 11$

Yesterday you saw 18 seagulls on the grass, and 38 flying past. How many seagulls did you see altogether?  $18 + 38 = 56$

Henry had installed 674 smoke detectors and was asked to install 128 more, how many smoke detectors will Henry have installed when he is done?  $674 + 128 = 802$

# Word Problems - Subtraction

Jill and I have 9 feet of licorice. I have 7 feet, how many feet does Jill have?  $9 - 7 = 2$

23 birds were sitting on the tree branch. A loud noise scared some of them away. Now there are only 9 birds on the branch. How many birds did the loud noise scare away?  $23 - 9 = 14$

Betty picked 208 apples and Patrick picked 134 apples. How many more apples did Betty pick than Patrick?  $208 - 134 = 74$

# Multiplication Table 12x

<b>X</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>1</b>	1	2	3	4	5	6	7	8	9	10	11	12
<b>2</b>	2	4	6	8	10	12	14	16	18	20	22	24
<b>3</b>	3	6	9	12	15	18	21	24	27	30	33	36
<b>4</b>	4	8	12	16	20	24	28	32	36	40	44	48
<b>5</b>	5	10	15	20	25	30	35	40	45	50	55	60
<b>6</b>	6	12	18	24	30	36	42	48	54	60	66	72
<b>7</b>	7	14	21	28	35	42	49	56	63	70	77	84
<b>8</b>	8	16	24	32	40	48	56	64	72	80	88	96
<b>9</b>	9	18	27	36	45	54	63	72	81	90	99	108
<b>10</b>	10	20	30	40	50	60	70	80	90	100	110	120
<b>11</b>	11	22	33	44	55	66	77	88	99	110	121	132
<b>12</b>	12	24	36	48	60	72	84	96	108	120	132	144

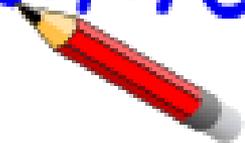
# Long Multiplication

$$612 \times 24$$

$$\begin{array}{r} 612 \\ \times 24 \\ \hline \end{array}$$


# Long Multiplication (cont)

$$612 \times 24$$

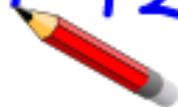
$$\begin{array}{r} 612 \\ \times 24 \\ \hline 2448 \end{array}$$


# Long Multiplication (cont)

$$612 \times 24$$

$$\begin{array}{r} 612 \\ \times 24 \\ \hline 2448 \\ + 1224 \\ \hline \end{array}$$

← move over one space



## Long Multiplication (cont)

$$612 \times 24$$

$$\begin{array}{r} 612 \\ \times 24 \\ \hline 2448 \\ + 1224 \leftarrow \text{move over} \\ \hline 14688 \end{array}$$

one space

# Long Division

Example: Divide 425 by 25

$$\begin{array}{ccc} 425 & \div & 25 \\ \nearrow & & \nwarrow \\ \text{dividend} & & \text{divisor} \end{array}$$

$$425 \div 25$$

$$25 \overline{)425}$$

$$4 \div 25 = 0 \text{ remainder } 4$$

$$25 \overline{)425} \begin{array}{r} 0 \\ \end{array}$$

$$25 \overline{)425} \begin{array}{r} 0 \\ 0 \\ \hline \end{array}$$

$$25 \times 0 = 0$$

$$25 \overline{)425} \begin{array}{r} 0 \\ 0 \\ \hline 4 \\ \end{array}$$

$$4 - 0 = 4$$

$$\begin{array}{r} 0 \\ 25 \overline{) 425} \\ \underline{0} \downarrow \\ 42 \end{array}$$

$$\begin{array}{r} 0 \\ 25 \overline{) 425} \\ \underline{0} \downarrow \\ 42 \end{array}$$

$$42 \div 25 = 1 \text{ remainder } 17$$

$$\begin{array}{r} 01 \\ 25 \overline{) 425} \\ \underline{0} \downarrow \\ 42 \end{array}$$

$$\begin{array}{r} 01 \\ 25 \overline{) 425} \\ \underline{0} \downarrow \\ 42 \\ \underline{25} \end{array}$$

$$25 \times 1 = 25$$

$$\begin{array}{r}
 01 \\
 25 \overline{) 425} \\
 \underline{0} \downarrow \\
 42 \_ \\
 \underline{25} \\
 17
 \end{array}$$

$$42 - 25 = 17$$

$$\begin{array}{r}
 01 \\
 25 \overline{) 425} \\
 \underline{0} \downarrow \\
 42 \\
 \underline{25} \downarrow \\
 175
 \end{array}$$

$$\begin{array}{r}
 01 \\
 25 \overline{) 425} \\
 \underline{0} \downarrow \\
 42 \\
 \underline{25} \downarrow \\
 175
 \end{array}$$

$$175 \div 25 = 7 \text{ remainder } 0$$

The answer is 17

$$\begin{array}{r} 017 \\ 25 \overline{)425} \\ \underline{0\downarrow} \\ 42 \\ \underline{25\downarrow} \\ 175 \end{array}$$

$$\begin{array}{r} 017 \\ 25 \overline{)425} \\ \underline{0\downarrow} \\ 42 \\ \underline{25\downarrow} \\ 175 \\ \underline{175} \end{array}$$

$$25 \times 7 = 175$$

$$\begin{array}{r} 017 \\ 25 \overline{)425} \\ \underline{0\downarrow} \\ 42 \\ \underline{25\downarrow} \\ 175 \\ \underline{175} \\ 000 \end{array}$$

$$175 - 175 = 0$$

# What is a ratio?

## Ratios

A ratio compares values.

A ratio says how much of one thing there is compared to another thing.

**3 : 1**



There are 3 blue squares to 1 yellow square

# Ratios shown different ways

Ratios can be shown in different ways:

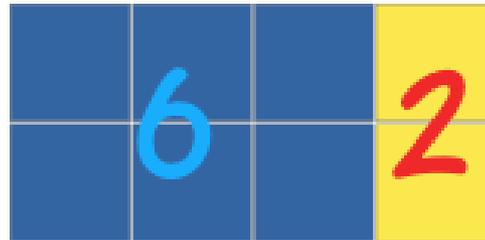
Using the ":" to separate the values: 3 : 1

Instead of the ":" you can use the word "to": 3 to 1

Or write it like a fraction:  $\frac{3}{1}$

# A ratio can be scaled up

**3 : 1**



Here the ratio is also 3 blue squares to 1 yellow square, even though there are more squares.

# “Part to Part” & “Part to Whole”

Example: There are 5 pups, 2 are boys, and 3 are girls



Part-to-Part:

The ratio of boys to girls is 2:3 or  $\frac{2}{3}$

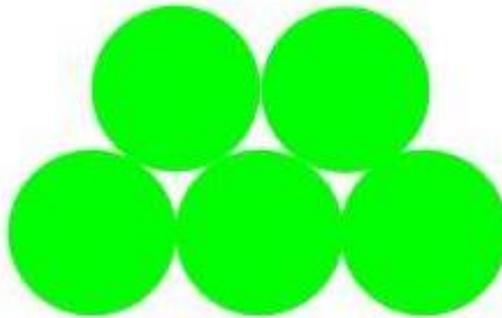
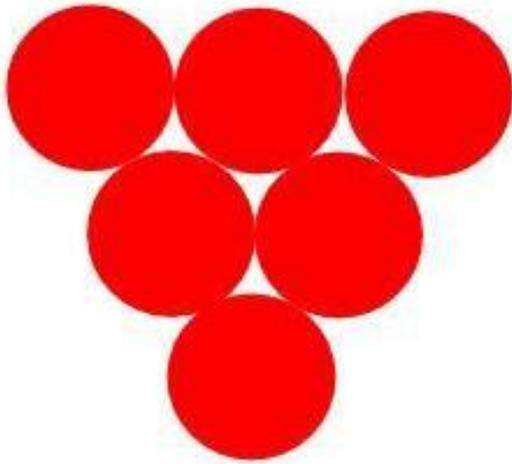
The ratio of girls to boys is 3:2 or  $\frac{3}{2}$

Part-to-Whole:

The ratio of boys to **all** pups is 2:5 or  $\frac{2}{5}$

The ratio of girls to **all** pups is 3:5 or  $\frac{3}{5}$

In the following diagram



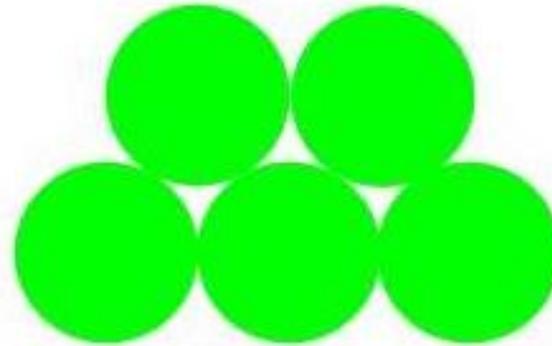
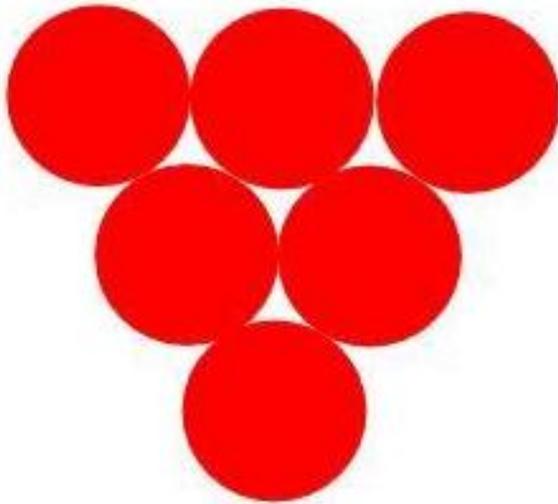
what is the ratio of green balls to red balls?

A 5:11

B 11:5

C 6:5

D 5:6



A 5:11

B 11:5

C 6:5

D 5:6

You got it Right!

There are 5 green balls and 6 red balls, so the ratio is 5:6

# Another sample ratio question

A class of 32 students has 12 girls. What is the ratio of girls to boys?

- a. 3:5
- b. 5:3
- c. 3:8
- d. 8:3

# Answer is 3:5

A class of 32 students has 12 girls. What is the ratio of girls to boys?

A 3:5

B 5:3

C 3:8

D 8:3

Excellent ... you are right.

The number of boys in the class =  $32 - 12 = 20$

So the ratio of girls to boys = 12:20

Cancel the common factor 4,

Therefore ratio of girls to boys =  $12:20 = 3:5$

# Commonly Occurring Values

Percent	Decimal	Fraction
1%	0.01	$\frac{1}{100}$
5%	0.05	$\frac{1}{20}$
10%	0.1	$\frac{1}{10}$
12½%	0.125	$\frac{1}{8}$
20%	0.2	$\frac{1}{5}$
25%	0.25	$\frac{1}{4}$
33 $\frac{1}{3}$ %	0.333...	$\frac{1}{3}$
50%	0.5	$\frac{1}{2}$
75%	0.75	$\frac{3}{4}$
80%	0.8	$\frac{4}{5}$
90%	0.9	$\frac{9}{10}$
99%	0.99	$\frac{99}{100}$
<b>100%</b>	<b>1</b>	
125%	1.25	$\frac{5}{4}$
150%	1.5	$\frac{3}{2}$
200%	2	

# Conversions:

**A Half** can be written...

As a fraction:  $\frac{1}{2}$

As a decimal: 0.5

As a percentage: 50%

**A Quarter** can be written...

As a fraction:  $\frac{1}{4}$

As a decimal: 0.25

As a percentage: 25%

# Working with decimals:

## Place values for numbers

Ten-Thousands	Thousands	Hundreds	Tens	Units
1	1	3	2	7
The Number 11,327				

# Sample question:

For the number 5,761,204, what does the 5 mean?

- a. 5 millions
- b. 5 hundred-thousands
- c. 5 ten-thousands
- d. 5 thousands

The correct answer is,  
a. 5 millions

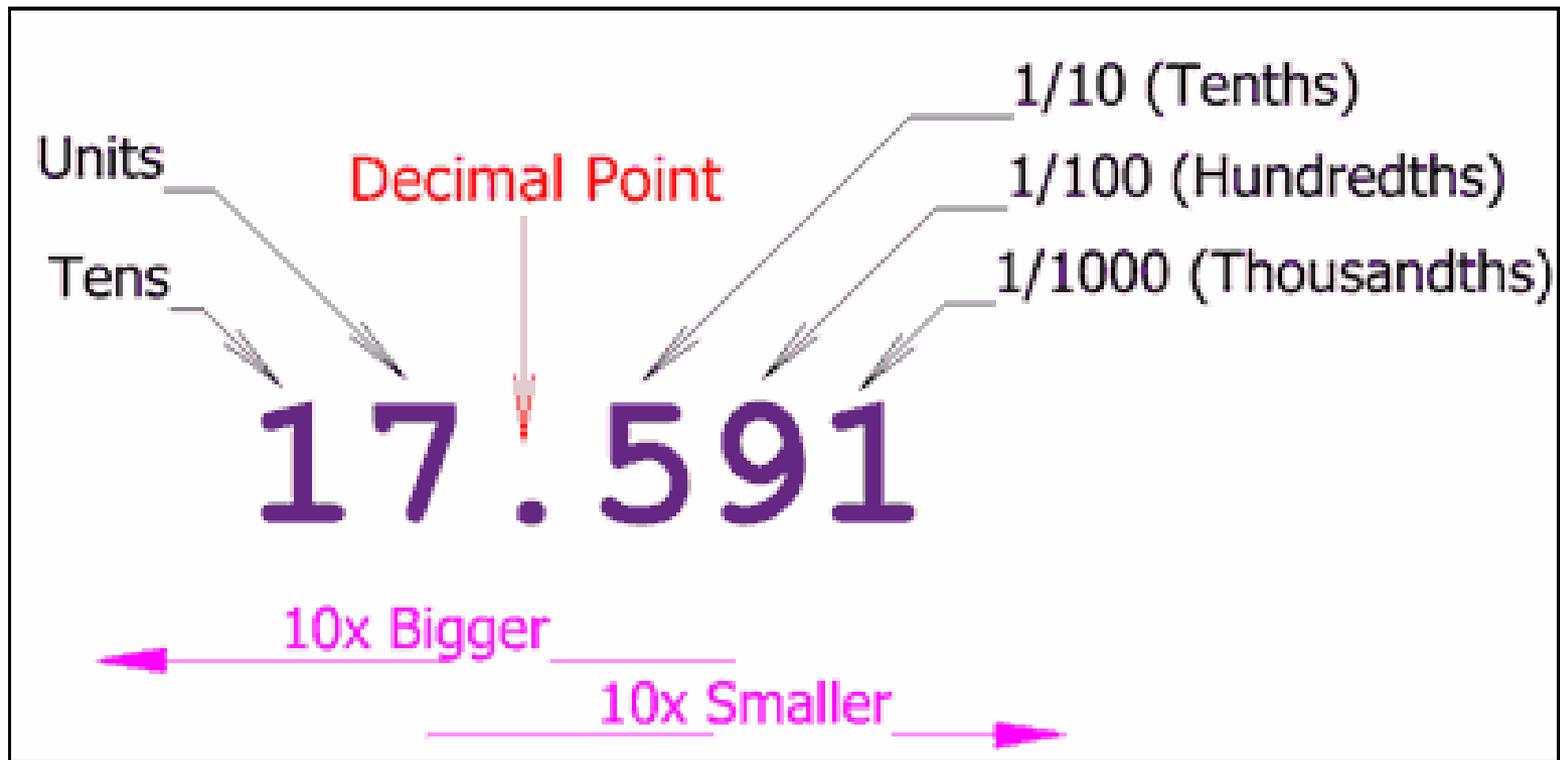
Millions	Hundred-Thousands	Ten-Thousands	Thousands	Hundreds	Tens	Units
5	7	6	1	2	0	4

The Number 5,761,204

Therefore the 5 means **5 millions**.

# Seventeen point Five Nine One

## 17.591



# Decimal sample

## Example 1: What is 2.3 ?

- On the left side is "2", that is the whole number part.
- The 3 is in the "tenths" position, meaning "3 tenths", or  $\frac{3}{10}$
- So, 2.3 is "2 and 3 tenths"

# Another decimal sample

Do you know what number is in the tenths position? The hundredths position?

## Example 2: What is 13.76 ?

- On the left side is "13", that is the whole number part.
- There are two digits on the right side, the 7 is in the "tenths" position, and the 6 is the "hundredths" position
- So, 13.76 is "13 and 7 tenths and 6 hundredths"

# Convert a decimal to a fraction

## Example: Express 0.75 as a fraction

**Step 1:** Write down 0.75 divided by 1:

$$\frac{0.75}{1}$$

**Step 2:** Multiply both top and bottom by **100** (there were 2 digits after the decimal point so that is  $10 \times 10 = 100$ ):

$$\begin{array}{c} \times 100 \\ \curvearrowright \\ \frac{0.75}{1} = \frac{75}{100} \\ \curvearrowleft \\ \times 100 \end{array}$$

*(Do you see how it turns the top number into a whole number?)*

# Simplify the fraction ( $.75 = \frac{3}{4}$ )

$$\begin{array}{ccc} \div 5 & & \div 5 \\ \curvearrowright & & \curvearrowright \\ \frac{75}{100} & = & \frac{15}{20} & = & \frac{3}{4} \\ \curvearrowleft & & \curvearrowleft & & \curvearrowleft \\ \div 5 & & \div 5 \end{array}$$

Answer =  $\frac{3}{4}$

Note:  $75/100$  is called a **decimal fraction** and  $3/4$  is called a **common fraction** !

# Express $\frac{3}{16}$ as a decimal

Step 1: We have to multiply 16 by **625** to become 10,000

Step 2: Multiply top and bottom by 625:

$$\begin{array}{c} \times 625 \\ \curvearrowright \\ \frac{3}{16} = \frac{1,875}{10,000} \\ \curvearrowleft \\ \times 625 \end{array}$$

Step 3: Write down 1875 with the decimal point 4 spaces from the right (because 10,000 has 4 zeros);

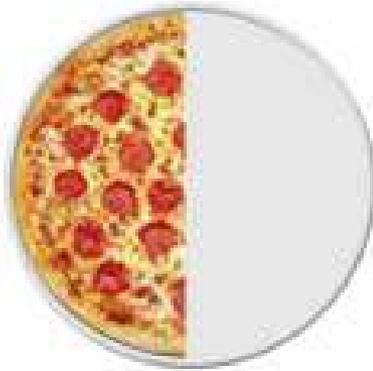
**Answer = 0.1875**

# STRATEGIC TOOLS

## ○ Fraction/ Decimal Conversions

- From fraction to decimal:
  - Divide the top number by the bottom number
- From decimal to fraction:
  - 1) Write down the decimal “over “ 1
  - 2) Multiply the top and bottom by 10 for every number of the decimal point.
  - 3) Simplify the fraction.

# Decimals, fractions, and percentages



**A Half** can be written...

As a fraction:

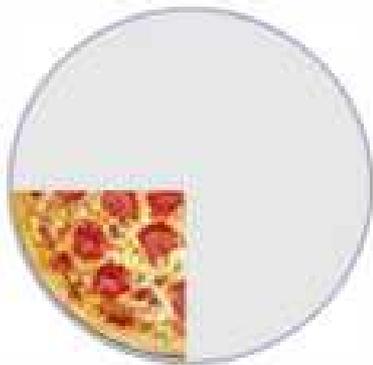
$$\frac{1}{2}$$

As a decimal:

**0.5**

As a percentage:

**50%**



**A Quarter** can be written...

As a fraction:

$$\frac{1}{4}$$

As a decimal:

**0.25**

As a percentage:

**25%**

# Examples

From Percent		To Decimal
75%	0.75	0.75

The diagram shows the conversion of 75% to the decimal 0.75. The number 0.75 is written in blue. Two green dots are placed above the digits 7 and 5. Two orange curved arrows point from these dots to the right, indicating a shift of two decimal places. Below the arrows, the text "2 Places" is written in orange.

From Decimal		To Percent
0.125	0.125	12.5%

The diagram shows the conversion of the decimal 0.125 to the percent 12.5%. The number 0.125 is written in blue. Two green dots are placed above the digits 1 and 2. Two orange curved arrows point from these dots to the right, indicating a shift of two decimal places. Below the arrows, the text "2 Places" is written in orange.

# Convert a fraction to a decimal

Example: Convert  $\frac{2}{5}$  to a decimal

Divide 2 by 5:  $2 \div 5 = 0.4$

**Answer:**  $\frac{2}{5} = 0.4$

# Convert a fraction to a percentage

**Example: Convert  $\frac{3}{8}$  to a percentage**

First divide 3 by 8:  $3 \div 8 = 0.375$ ,

Then multiply by 100:  $0.375 \times 100 = 37.5$

Add the "%" sign: 37.5%

**Answer:  $\frac{3}{8} = 37.5\%$**

# Convert percent to a fraction

Example: To convert 80% to a fraction

Steps	Example
Convert 80% to a decimal (=80/100):	0.8
Write down the decimal "over" the number 1	$0.8 / 1$
Then multiply top and bottom by 10 for every number after the decimal point (10 for 1 number, 100 for 2 numbers, etc)	$0.8 \times 10 / 1 \times 10$
(This makes it a correctly formed fraction)	$= 8 / 10$
Then <a href="#">Simplify</a> the fraction	$4 / 5$

# SAMPLE QUESTIONS

1. 22% of 840 is equal to
  - a. 18.48
  - b. 148.8
  - c. 184.8
  - d. 1848

To find this answer, you must convert the percentage to a decimal. Remember percentages are always out of 100. So, you move the decimal 2 spaces to the left. Therefore, 22% become .22; Whereas, 2% would be .02.

Then multiply the decimal by the number you are trying to get a percentage of. In this case, 840.

So,  $840 \times .22$  equals 184.80



2. How many fluid ounces equal one pint? (refer to the following measurement chart)

- a. 4
- b. 8
- c. 16
- d. 32

- Be familiar with measurement charts to assist in unit conversions.

Gallons	Quarts	Pints	Fluid Ounces
1	4	8	128
	1	2	32
		1	16
			1

# STRATEGIC TOOLS (cont.)

## ◦ **Word Problem Tips**

- Read the problem a few times.
- Translate the English terms into an algebraic equation.
  - Sum, add, in addition, more than: (+)
  - Subtract, difference, less than: (-)
  - Product, times, of, percent of: (x)
  - Divide, per: ( $\div$ )
  - Is, equal, will be, results: (=)

More examples and  
practice can be found at:

[www.mathisfun.com](http://www.mathisfun.com)

# MECHANICAL APTITUDE

## What is mechanical aptitude?

- Mechanical aptitude describes the capacity to apply simple mechanical and physical principles.
- In other words, it describes a person's ability to figure out how objects work and move, alone and in relation to other objects.

# MECHANICAL APTITUDE

- Knowledge of simple machines and hand tools:
  - Levers, wheels, and belt drives
  - Pry bars, shovels, axes, and chain saws
- Ability to predict the effects of changes in operating forces
  - Ex: Determining the safest place to cut through a wall in a burning structure.

# MECHANICAL APTITUDE

- The candidate is **NOT** expected to have prior knowledge about mechanical tools/devices.
- Rather, the candidate is expected to have the ability to understand and solve problems based on the information presented.

For example, mechanical aptitude is an underlying capacity that helps a person understand how to

- **Assemble a cardboard storage box**
- **Use a jack to fix a flat tire**
- **Install a new ink cartridge into a printer**
- **Maneuver furniture through doorways**

Of course, the extent to which a person uses mechanical aptitude depends on the activities he or she must accomplish. Successful performance of tasks in many occupations – *such as firefighter* – relies upon workers having strong mechanical aptitude.

## **How is mechanical aptitude assessed?**

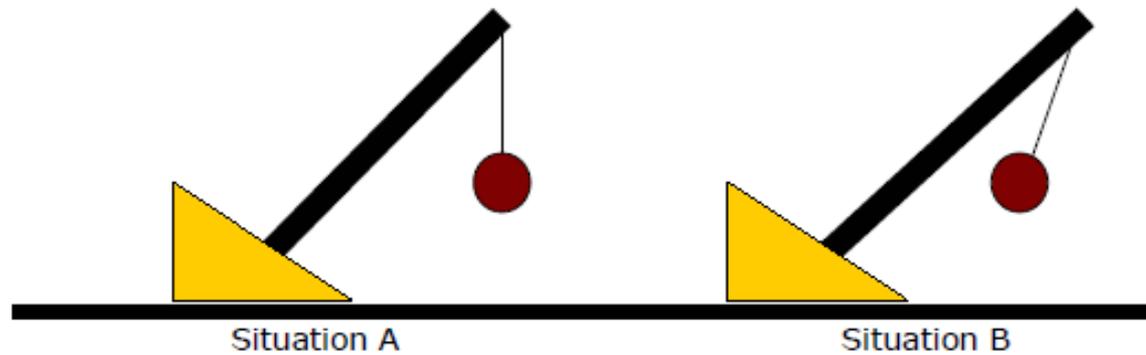
While there are several ways to assess mechanical aptitude, the multiple-choice written test is often used because it is cost-effective, efficient, and useful.

Written mechanical aptitude questions typically present a picture or diagram of an object or situation that you must analyze in order to find an answer to a question posed about it. You must then choose from among several possible responses, only one of which is correct.

<b>Mechanical Aptitude Component</b>	<b>Sample Question Types</b>
<b>1. Gravity</b>	<ul style="list-style-type: none"><li>• <i>Motionless Object</i></li><li>• <i>Object in Motion</i></li></ul>
<b>2. Mechanical Reasoning</b>	<ul style="list-style-type: none"><li>• <i>Wheels and Axles (pulleys and gears)</i></li><li>• <i>Levers</i></li><li>• <i>Inclined Plane</i></li><li>• <i>Wedge</i></li><li>• <i>Screws (Threaded Hardware)</i></li></ul>
<b>3. Visual/Spatial Relations</b>	<ul style="list-style-type: none"><li>• <i>Hidden Figure</i></li><li>• <i>Spatial Views</i></li><li>• <i>Block Counting</i></li><li>• <i>Paper Folding</i></li></ul>
<b>4. Tool Knowledge</b>	<ul style="list-style-type: none"><li>• <i>Tool Types</i></li><li>• <i>Tool Use</i></li></ul>

# Gravity

*Example:*



If the objects presented above are not in motion, which represents an **unlikely** situation?

- A. Situation A
- B. Situation B
- C. Both are equally likely
- D. Both are equally unlikely

# Clockwise vs. Counterclockwise

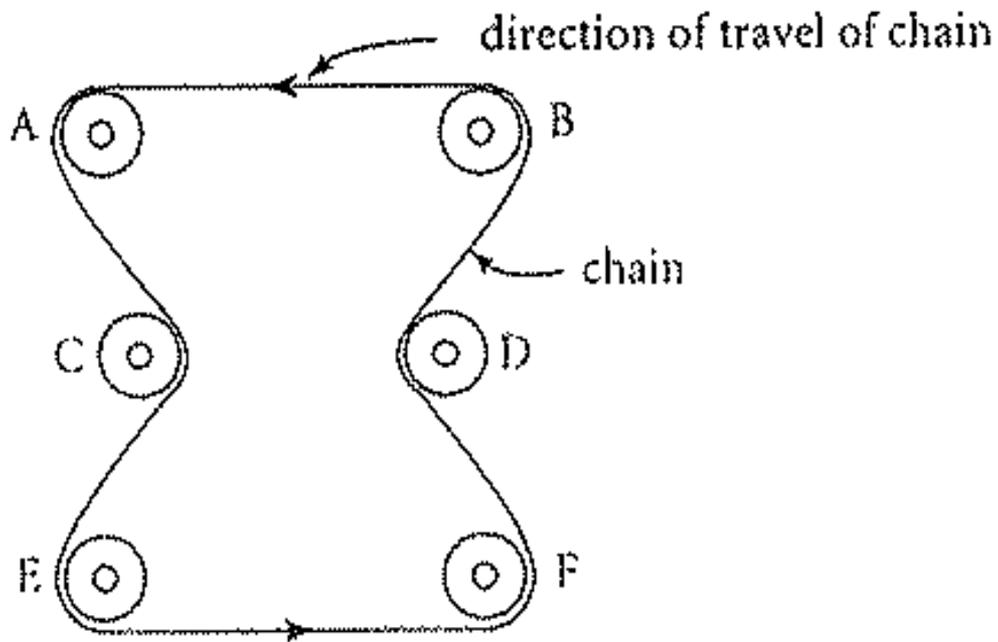


*Example:*

If Pulley A is turning clockwise, Pulley B is turning

- A. clockwise.
- B. counterclockwise.

# SAMPLE FIGURE



# SAMPLE QUESTION

1. In the diagram shown above, which gears are turning counter clockwise?
  - a. A, C, and E
  - b. B, D, and F
  - c. C and D
  - d. E and F



# ANSWER – d

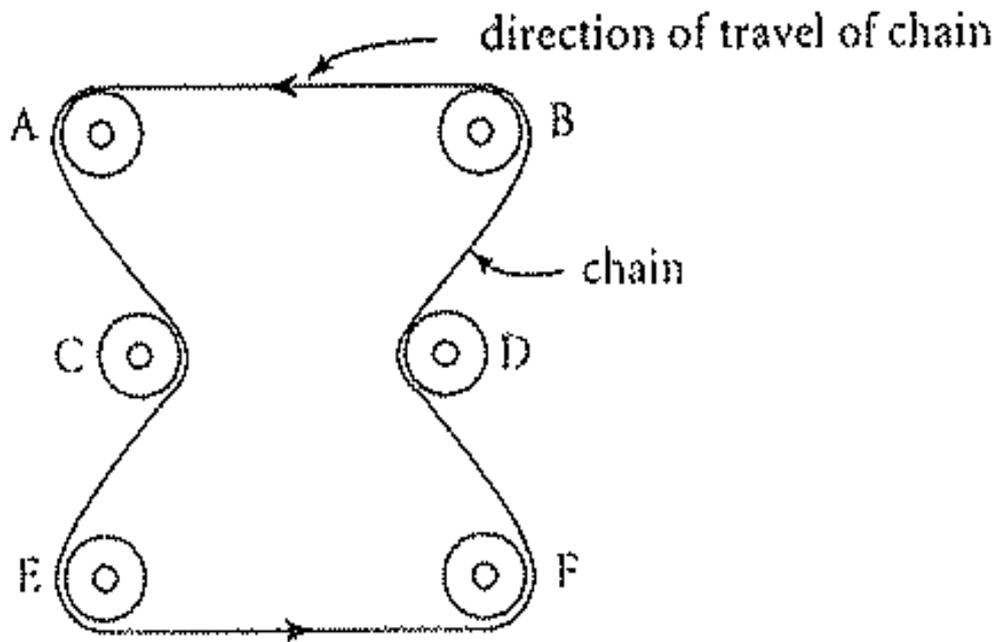
Gears E and F. At least one gear in each of the other answers is turning clockwise.

It helps to follow the direction of the chain, which is connected to all of the gears.

Although gears A and B are also turning counter-clockwise, the only correct answer offered is – **answer d**.



# SAMPLE FIGURE



# SAMPLE QUESTION

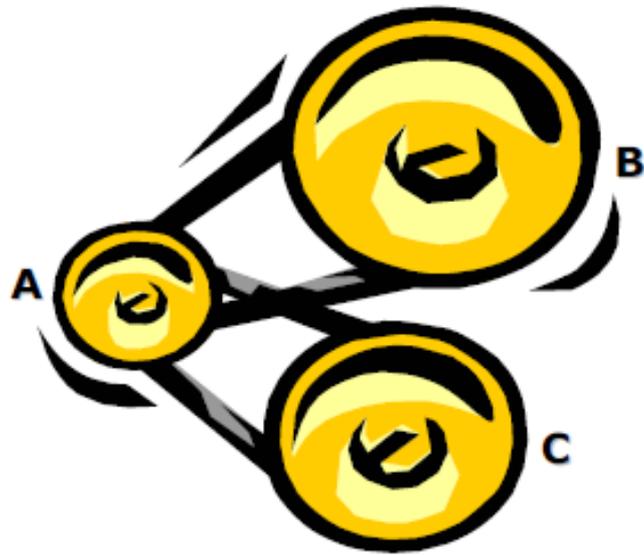
1. In the diagram shown above, gear B travels in the same direction as?
  - a. A and F
  - b. C and D
  - c. E and F
  - d. A, E and F



# ANSWER -d

Read all of the options before selecting your answer. Although option a. A and F, is correct, E is left out. Although option c. E, and F, is correct, A is left out. Option d. includes A,E, and F. This is the most correct response.





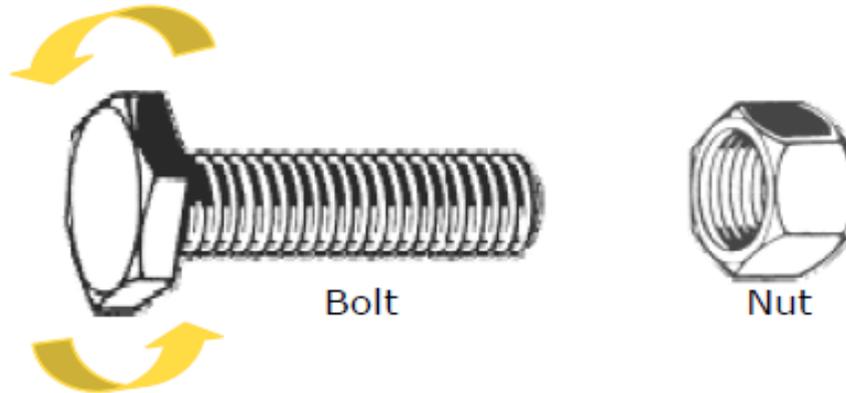
*Example:*

Which of the pulleys will complete the most revolutions per minute?

- A. Pulley A
- B. Pulley B
- C. Pulley C
- D. The pulleys will make an equal number of revolutions per minute.

**The answer is A.** Notice that pulley A is the smallest of the three pulleys in the group. Because of its size, it has a shorter distance to travel to complete one revolution. Another way to phrase the question would be to ask which pulley is moving fastest, in which case the same thought process is used.

*Example:*



Assuming the standard threading of the nut and bolt match, what will happen if the bolt is inserted into the end of the nut and turned in the direction indicated by the arrows?

- A. It will thread into the nut.
- B. It will not thread into the nut.
- C. It will become cross-threaded in the nut.
- D. It is impossible to tell.

**The answer is B.** A bolt with standard threading will be drawn into a nut when turned to the right (clockwise), but will be pushed apart when turned to the left (counterclockwise).

# Screws & threaded hardware

Questions about screws or other threaded hardware assess your knowledge of how the direction of rotation affects the work that must be performed. Below are some *key facts* that may be useful for answering questions about threaded hardware.

## *Key Facts*

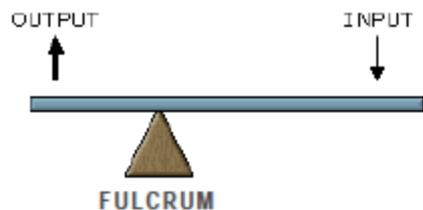
- The turning direction (clockwise or counterclockwise) dictates whether the hold between a screw and other object is tightened or loosened. If being tightened, each consecutive turn or rotation of the screw will move it further into the object and make the hold stronger. If being loosened, each turn or rotation of the screw will move it further out of the object and make the hold weaker.
- Standard threading requires clockwise (right) rotation to tighten and counterclockwise (left) rotation to loosen the hold. The colloquial phrase “righty-tighty, lefty-loosey” can help you remember this rule. However, some screws have a reverse-thread, in which case the opposite would be true. Unless otherwise specified, you should use the rule of standard threading to answer questions.
- The distance between the threads depends on the slope of the inclined plane - the steeper the slope, the wider the thread. Screws with less distance between the threads are easier to turn.

# Levers

A lever is a simple machine made with a bar that moves on a surface point called a fulcrum. Force (input) is exerted upon the bar to move (output) an object or load.

The following information about these simple machines will help you answer questions about how they work.

### 1st Class Lever



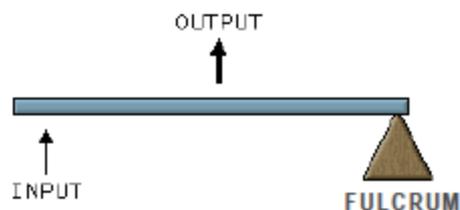
With this type of lever, the fulcrum is in between the load on one end and the force on the other.

#### **Example: Crowbar**

When you apply downward force (input) to one end of the crowbar, the opposite end lifts upward at the point where the crowbar meets the surface of a board so as to pry up a nail (output/load).



### 2nd Class Lever



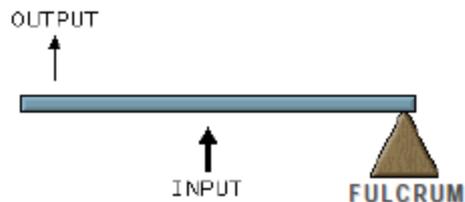
With this type of lever, the fulcrum is on the end, the load is in between, and the force is at the other end.

#### **Example: Wheelbarrow**

When you lift up (input/force) on one end of the wheelbarrow it is raised at the point where it meets a wheel (fulcrum) and the barrow (output/load) is also lifted.



### 3rd Class Lever



With this type of lever, the fulcrum is on one end, the force is in between, and the load is at the other end.

#### **Example: Baseball Bat**

When you apply swinging force with your hands (fulcrum), the bat moves to hit a ball (output/load).

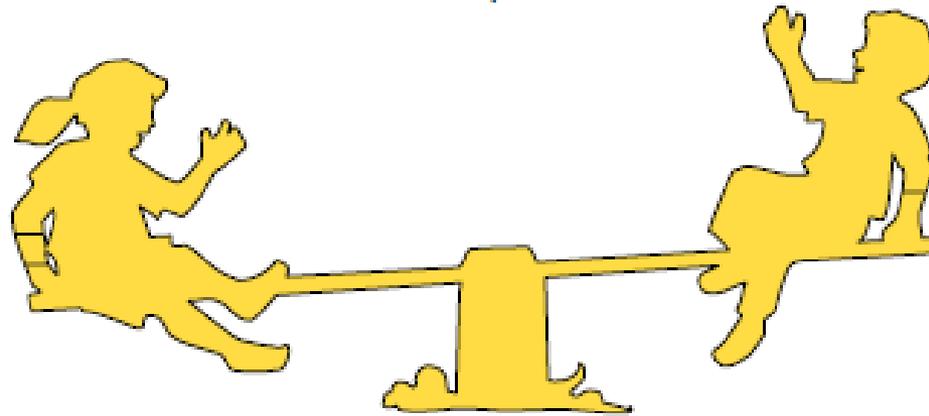


# Lever Facts

## *Key Facts*

- The fulcrum can be moved depending on the weight of the load to be lifted or the force you wish to exert.
- The closer the load is to the fulcrum, the easier it is to move.
- The shorter side of a lever has more work to do to counter the effect of a longer side.
- Generally, whenever force is applied to a point more distant from the fulcrum, less force is needed to accomplish the same amount of work (i.e., more leverage is given). Hence, an equal amount of force will do more work as it moves away from the fulcrum.

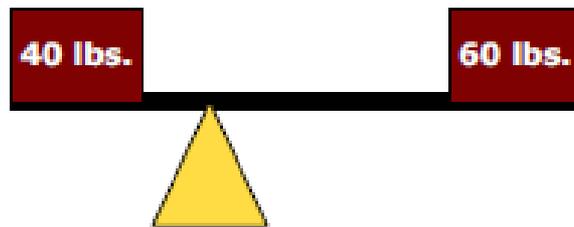
*Example:*



The person on the left is lower than the person on the right. What can the person on the right do in order to make the seesaw more level?

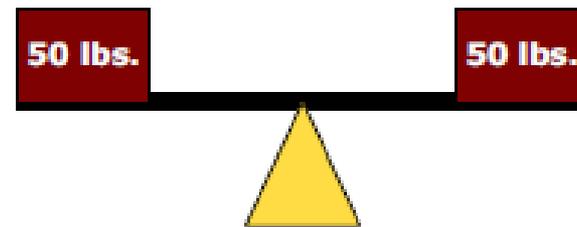
- A. Slide forward
- B. Sit up straight
- C. Slide backward
- D. Lean forward

The answer is C. Because the load is nearly balanced, shifting the weight of the person on the right further away from the fulcrum will accomplish the additional work needed to balance the beam.



Situation A

*Example:*



Situation B

Of the two situations depicted above,

- A. only A is physically possible.
- B. only B is physically possible.
- C. both A and B are physically possible.
- D. it is impossible to tell which of the two is possible.

The answer is B. In Situation B, the length of the lever on both sides of the fulcrum is equal, as is the weight supported on each side. This represents a "balanced" situation. It is physically impossible for the lever to remain balanced in Situation A because there is more weight on the right side. Even if the weights of the load were equal, the lever would still not balance because the right side of the lever is longer than the left side.

# WRITTEN TEST PREPARATION

- The test is NOT intended to be one you should have to study for. The questions are based on a high school education.
- **We strongly urge you to:**
  - Read articles/books on practical subjects.
  - Review and practice mathematical computations and applications.
  - Review mechanical aptitude problems to familiarize yourself with the format of test questions.

Written test prep information and links are online:

**<http://joinlafd.org/writtentestprep.html>**

# OVERALL TEST STRATEGIES

- **Read the entire question carefully.**
  - Know what the questions ask.
  - Know what the answer choices say.
- **Choose the answer that is **GENERALLY** best.**
  - Answer according to what is generally or usually true.
  - The best answer is the one that is right, under ordinary conditions.

# EXAMPLE

**The number of days in a year is**

- a. 365
- b. 366
- c. 367
- d. 368

- The answer you should choose is **Choice A**, because it is the one which is most often correct.
- Choice B is true for leap years, but most years have 365 days.

# TEST STRATEGIES (cont.)

- **Use your time efficiently.**
  - NOT a speed test.
  - Read at your normal speed.
  - Eliminate choices you know are wrong.
  - Move right along!

# TEST STRATEGIES (cont.)

- **Make decisions.**

- Do you know the answer?
- Do you think you might know the answer?
- Do you have NO Idea?

- **Don't give up!**

- **Don't change answers too much.**

# PERFORMING YOUR BEST

- Get plenty of sleep.
- Eat a well-balanced breakfast.
- Allow plenty of time before the test.
- Arrive early to avoid traffic and find a parking space.



# QUESTIONS?

LA City Personnel Department (213) 473-9060  
LAFD Recruitment (855) 552-LAFD

[www.joinLAFD.org](http://www.joinLAFD.org)

