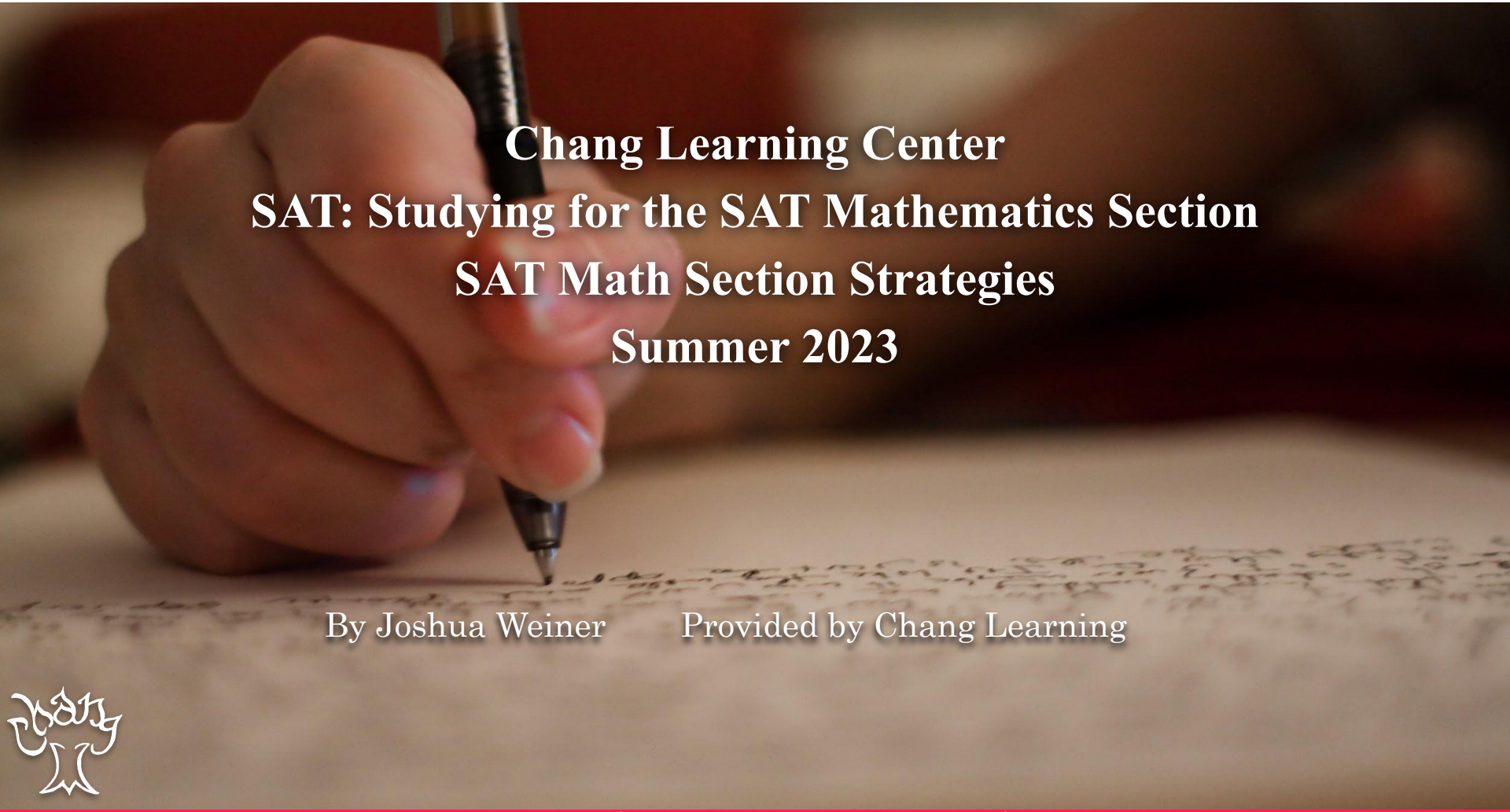


Chang Learning Center
SAT: Studying for the SAT Mathematics Section
SAT Math Section Strategies
Summer 2023

By Joshua Weiner Provided by Chang Learning


Icebreaker
Think of one common mistake you make when solving a difficult math problem?

SAT Math Sections Overview

- The mathematics questions on the SAT will focus on:
-
    - Algebra
    - Geometry
    - Coordinate Planes
    - Charts and Graphs
    - Probability and Statistics
    - Other Mathematics Topics

- SAT Section 3 - Math Test - No calculator: 25 minutes, 20 Questions
- SAT Section 4 - Math Test - Use your calculator: 55 minutes, 38 Questions

SAT Overview

Name: Date:

Chang Learning	SAT Lesson 1: SAT Overview, Basic Algebra Review

Scholastic Achievement Test (SAT)

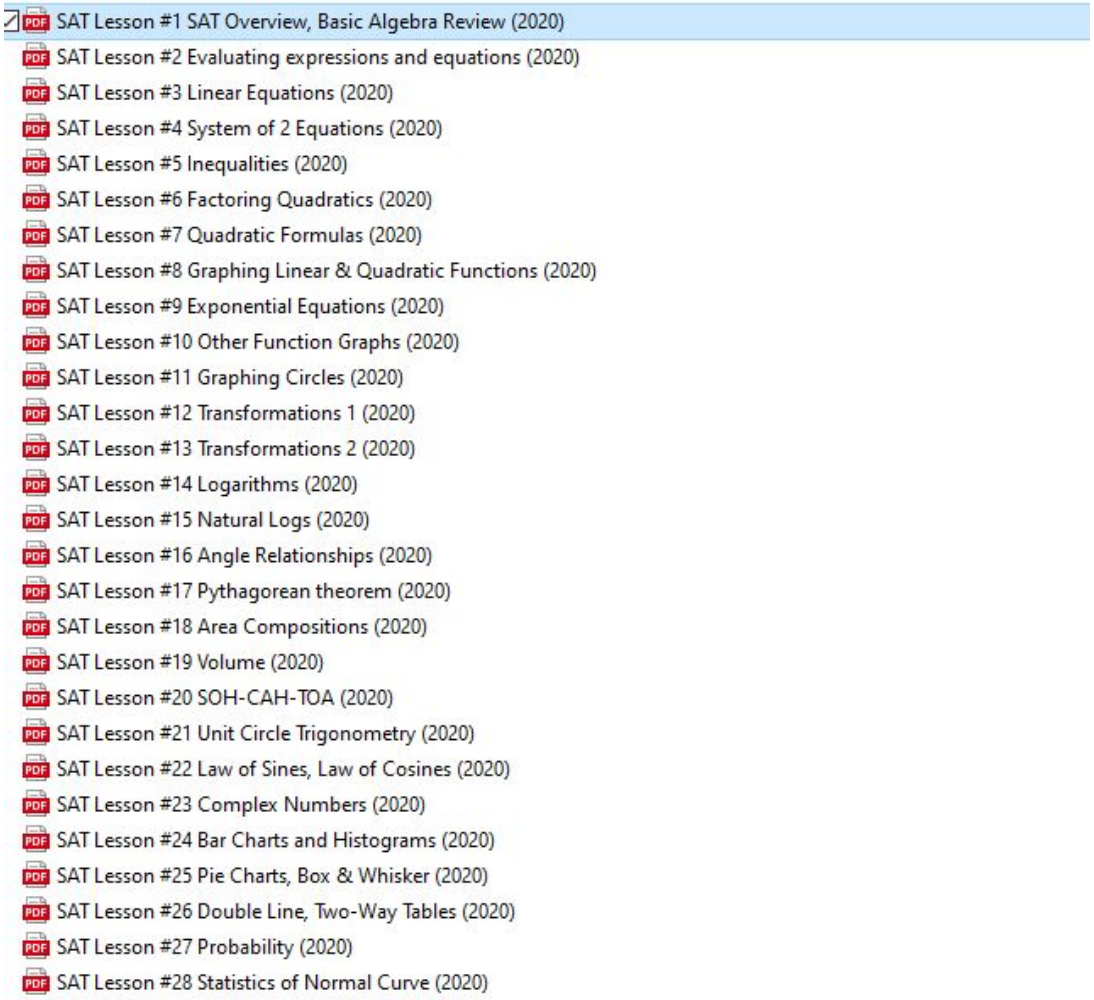
For those interested in pursuing higher education, the SAT is still considered to be the benchmark exam as a metric for student academic progress. In the past few years, the number of seniors taking the SAT in the United States has increased from 1 to over 1.7 million. The mathematics questions on the SAT are contained in two sections:

Section 3	Section 4
20 Questions	38 Questions
25 Minutes	55 Minutes
No Calculator	Calculator
15 Multiple Choice	30 Multiple Choice
5 Grid In Questions	8 Grid In Questions

According to most sources, the SAT contains the following topics in the 58 test questions:

Topic	Subtopic	3	4
Algebra	Linear Equations	40%	30%
	Systems of Equations		
	Linear Inequalities		
Problem Solving & Data Analysis	Ratios & Proportions	0%	45%
	Representing Quantitative Data		
	Probability		
Passport to Advanced Mathematics	Equivalent Algebraic Expressions	45%	15%
	Quadratic & Nonlinear Functions		
Geometry	Area & Volume	15%	10%
	Polygons, Circles		

SAT Mathematics Preparation Course



Name: Date:

Chang Learning	SAT Lesson 1: SAT Overview, Basic Algebra Review

The test questions are a combination of algebraic expressions, algebraic equations, word problems and graphics. Each section follows an "easy to hard" level of difficulty. The MULTIPLE CHOICE questions and GRID-IN questions are grouped from easy to hard (below ranked as question types "level 1 to 5".

Section 3
1 = *easy level*
5 = *difficult*

0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	2
1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
1	1	1	2	1	3	1	1	1	2	2	4	3	5	5	1	1	3	5	4

Section 4
1 = *easy level*
5 = *difficult*

0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	2
1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
1	1	1	2	1	1	3	2	1	1	3	2	3	1	4	2	3	4	3	5
2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3			
1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8		
5	4	3	3	5	4	4	5	4	5	1	1	2	2	3	5	4	5		

This is important for time management on the SAT. If you are short on time, then it is important to answer as many SAT questions as possible. You can SKIP the end subsection questions and jump to the first GRID-IN questions and complete them first. Then, if time permits, go and complete the hard level questions at the end of each subsection.

The breakdown of the SAT Mathematics Sections				
	Easy	Difficult	Easy	Difficult
Section 3	#1 to 10	#11 to 15	#16 to 17	#18 to 20
Section 4	#1 to 20	#21 to 30	#31 to 34	#35 to 38

SAT Mathematics Questions:

A Practical Beginner Strategy:

Complete Section 3: #1-10 and #16-18 (13 Questions)
Complete Section 4: #1-20 and #31-34 (24 Questions)

These are 37 of the 58 total Mathematics Questions.

A raw score of 24-40 correct usually earns a mathematics SAT score of 500-600.

Name: Date:

Chang Learning	SAT Lesson 1: SAT Overview, Basic Algebra Review

The test questions are a combination of algebraic expressions, algebraic equations, word problems and graphics. Each section follows an "easy to hard" level of difficulty. The MULTIPLE CHOICE questions and GRID-IN questions are grouped from easy to hard (below ranked as question types "level 1 to 5".

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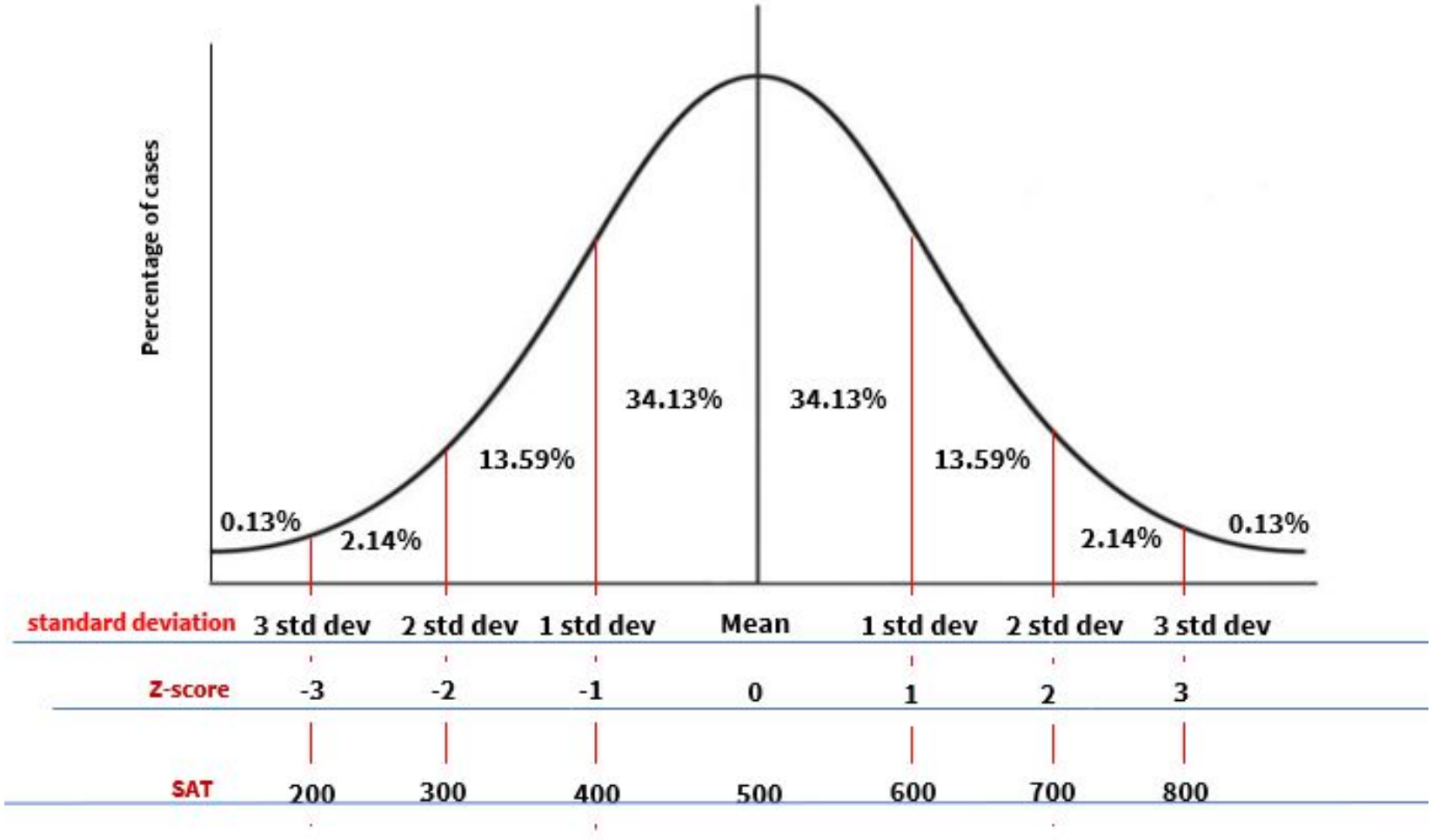

Percentage of cases
0.13%
2.14%
13.59%
34.13%
34.13%
13.59%
2.14%
0.13%
standard deviation
3 std dev
2 std dev
1 std dev
Mean
1 std dev
2 std dev
3 std dev
Z-score
-3
-2
-1
0
1
2
3
SAT
200
300
400
500
600
700
800

SAT Algebra

Some Additional Examples

Algebra

Systems of Two Linear Equations

Geometry Problems

Use the SAT formula sheet
Some problems include:

- 2-D Area Compositions (mid level)
- 3-D problems with volume
- Pythagorean Theorem
- SOH-CAH-TOA

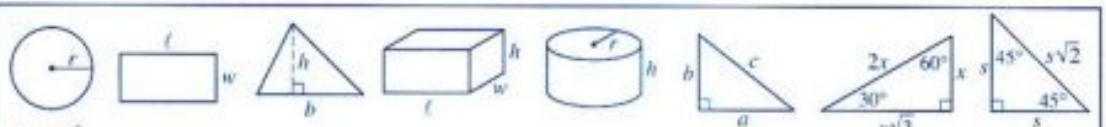
Most of the important mathematics formulas are included on the first page of each section, the SAT formula sheet. Note that not all the formulas that are on the test are provided there. Below the page are more common formulas and mathematics facts that should be known as you prepare for the SAT.

SAT Formula Sheet

Notes

1. The use of a calculator is permitted.
2. All numbers used are real numbers.
3. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.
4. Unless otherwise specified, the domain of any function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number.

Reference Information



$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

$A = \frac{1}{2}bh$

$V = \ell wh$

$V = \pi r^2 h$

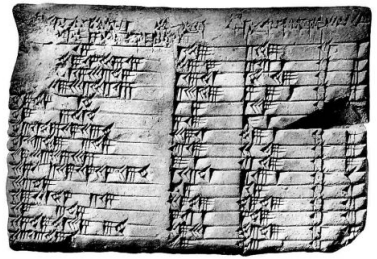
$c^2 = a^2 + b^2$

Special Right Triangles

The number of degrees of arc in a circle is 360.

The sum of the measures in degrees of the angles of a triangle is 180.

Pythagorean Theorem

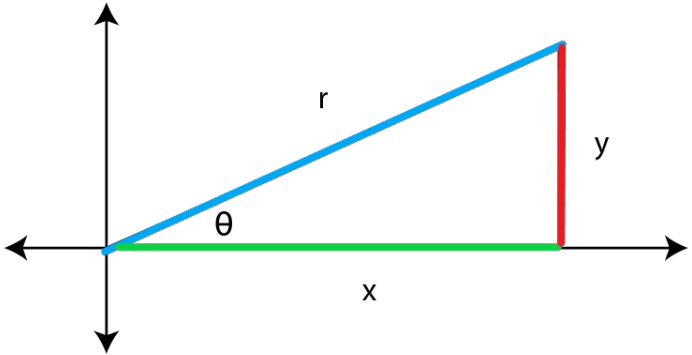


This clay tablet from the Babylonian Empire (300 BCE) contains a list of Pythagorean Triples in Sexigesimal (base 60) notation. The cuneiform wedge marks show a list that includes {3,4,5} dilated D_{15} = {45,60,75}. Also {65,72,97} and other integer values with decreasing slope ratios for each row representation. Was it for architectural use?

SOH CAH TOA

SOH - CAH - TOA

$$\sin\theta = \frac{\text{Opposite}}{\text{Hypotenuse}} \qquad \cos\theta = \frac{\text{Adjacent}}{\text{Hypotenuse}} \qquad \tan\theta = \frac{\text{Opposite}}{\text{Adjacent}}$$



$$\sin\theta = \frac{y}{r}$$

$$\cos\theta = \frac{x}{r}$$

$$\tan\theta = \frac{y}{x}$$

$r = 1$

Tackling SAT Probability & Statistics Problems

These problems include your ability to solve for *average*, *mean*, *median*, *mode*.

- Example:

Tackling Charts & Graphs Problems

These type of questions will as you to complete information from given data and answer word problems. (The two way table)

- Example:

Tackling Other Misc. Math Questions

These problems include:

- Angle Relationships
- Circle Relationships
- Exponents and Logarithms
- Law of Sines
- Law of Cosines
- Complex Numbers
- Exponential Equations, Higher Order Polynomials
- Function Compositions
- Normal Curve
- Scatter Plots

SAT Classwork Sample

{ Easy Level }
{ Mid Level }
{ Challenge Level }

Name: Date:

Chang Learning	SAT Lesson 1: SAT Overview, Basic Algebra Review

SAT Lesson #1 Classwork: Basic Algebra Review

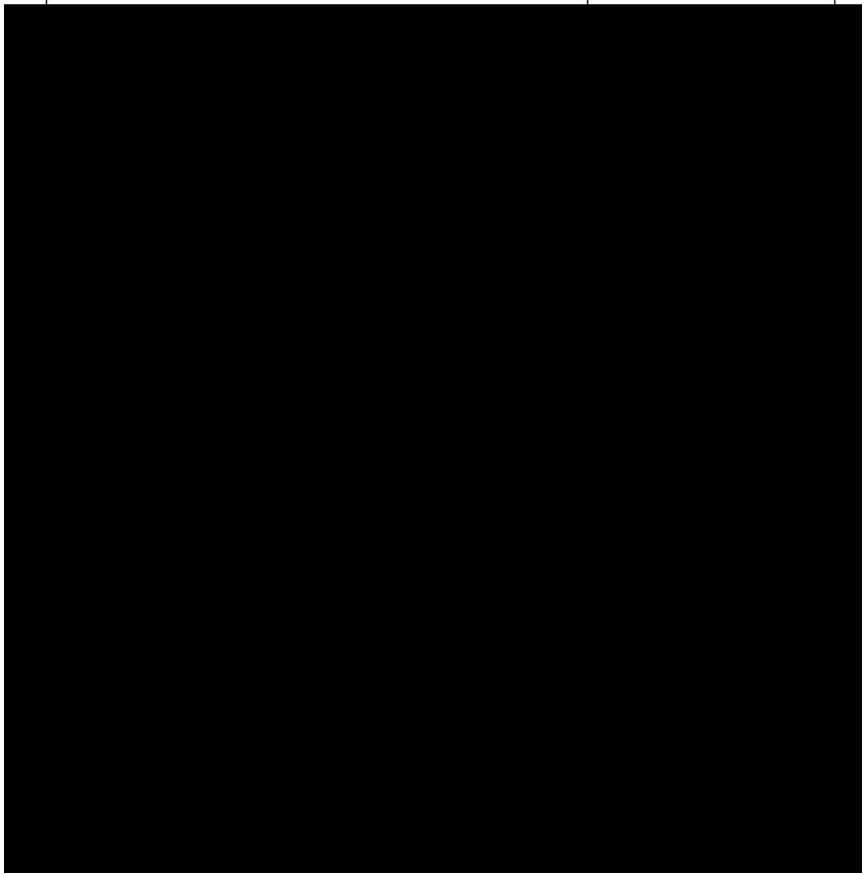
1. **(Easy Level)** Simplify the expression below $[100 - 2(5 + 6^2 - 7)] \div 3$	A) $26\frac{2}{3}$ B) $18\frac{1}{3}$ C) $10\frac{2}{3}$ D) $7\frac{1}{3}$
2. **(Easy Level)** If $\frac{a}{b} = 3$, what is the value of $\frac{6b}{a}$?	A) 0 B) 1 C) 2 D) 4
3. **(Mid Level)** Which of the following is equivalent to the expression ? $(x^2y - 16y^2 + 5xy^2) - (-x^2y + 3xy^2 - 16y^2)$	A) $4x^2y^2$ B) $8xy^2 - 6y^2$ C) $2x^2y + 2xy^2$ D) $2x^2y + 8xy^2 - 6y^2$
4. **(Mid Level)** Hosoi Lounge Lizards makes custom skateboards for its customers. Five wooden skateboards and four fiberglass skateboards cost $1100. Three wooden skateboards and one fiberglass skateboard cost $450. How much would Hosoi Lounge Lizards charge a customer who purchases two wooden skateboards and three composite skateboards?	A) $1,100 B) $1,000 C) $950 D) $650
5. **(Challenge Level)** In one semester, Anne and Betty spent a combined 250 work hours in the tutoring lab. Anne spent 40 more hours in the lab and than Betty did. If one work day is 5 hours in the lab, how many days did Anne work in the tutoring lab ?	Grid-In:

1. **(Easy Level)**

Simplify the expression below

$$[100 - 2(5 + 6^2 - 7)] \div 3$$

A) $26\frac{2}{3}$
B) $18\frac{1}{3}$
C) $10\frac{2}{3}$
D) $7\frac{1}{3}$



1. **(Easy Level)**

Simplify the expression below

$[100 - 2(5 + 6^2 - 7)] \div 3$

A) $26\frac{2}{3}$

B) $18\frac{1}{3}$

C) $10\frac{2}{3}$

D) $7\frac{1}{3}$

[100-2(5+36-7)] / 3

[100 - 2 (34)] / 3

[100 - 68] / 3

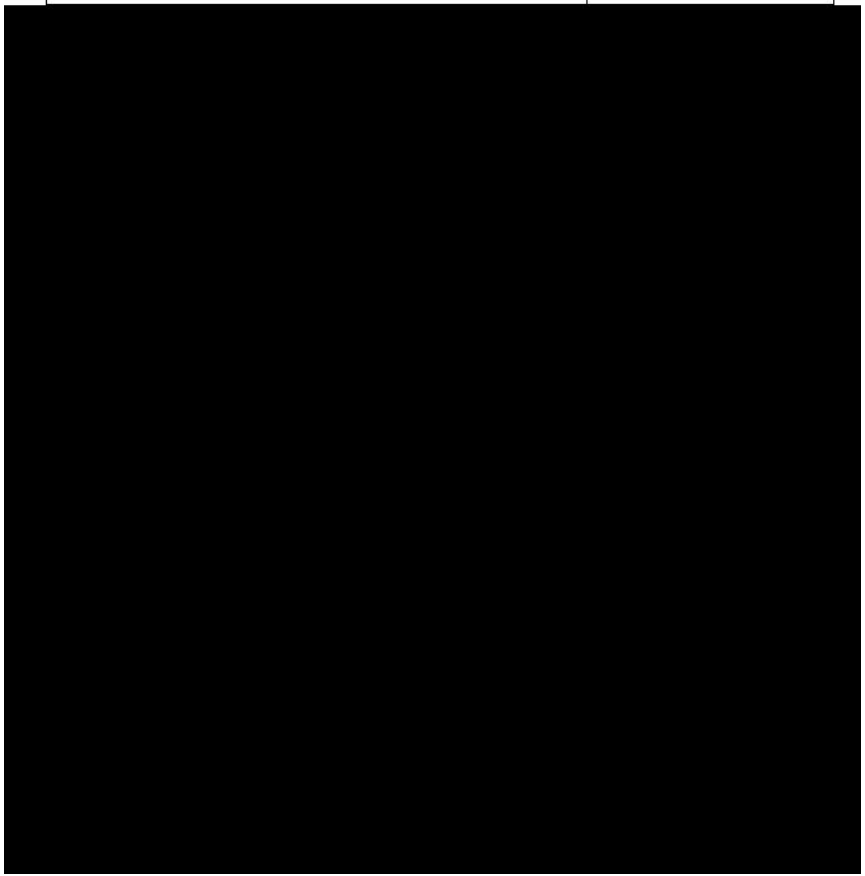
[32] / 3

10 and 2/3

2. **(Easy Level)**

If $\frac{a}{b} = 3$, what is the value of $\frac{6b}{a}$?

A) 0
B) 1
C) 2
D) 4



2. **(Easy Level)**

If $\frac{a}{b} = 3$, what is the value of $\frac{6b}{a}$?

A) 0
B) 1
C) 2 ✓
D) 4

a/b = 3/1 then **b/a = 1/3**

$$\frac{b}{a} = \frac{1}{3}$$

$$\frac{6b}{a} = \frac{6*1}{3} = \frac{6}{3} = 2$$

3. **(Mid Level)**

Which of the following is equivalent to the expression ?

$$(x^2y - 16y^2 + 5xy^2) - (-x^2y + 3xy^2 - 16y^2)$$

A) $4x^2y^2$

B) $8xy^2 - 6y^2$

C) $2x^2y + 2xy^2$

D) $2x^2y + 8xy^2 - 6y^2$

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D) $2x^2y + 8xy^2 - 6y^2$

group like terms

$$x^2y - 16y^2 + 5xy^2$$

$$+ x^2y + 16y^2 - 3xy^2$$

$$2x^2y \qquad + 2xy^2$$

3. **(Mid Level)**

Which of the following is equivalent to the expression ?

$(x^2y - 16y^2 + 5xy^2) - (-x^2y + 3xy^2 - 16y^2)$

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group like terms

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$+ x^2y + 16y^2 - 3xy^2$

$2x^2y \qquad + 2xy^2$

4. **(Mid Level)**

Hosoi Lounge Lizards makes custom skateboards for its customers. Five wooden skateboards and four fiberglass skateboards cost $1100. Three wooden skateboards and one fiberglass skateboard cost $450. How much would Hosoi Lounge Lizards charge a customer who purchases two wooden skateboards and three composite skateboards?

A) $1,100
B) $1,000
C) $950
D) $650

[redacted]

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A) $1,100
B) $1,000
C) $950
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w = wooden
f = fiberglass

$$5w + 4f = \$1100$$
$$3w + 1f = \$450$$

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Hosoi Lounge Lizards makes custom skateboards for its customers. Five wooden skateboards and four fiberglass skateboards cost $1100. Three wooden skateboards and one fiberglass skateboard cost $450. How much would Hosoi Lounge Lizards charge a customer who purchases two wooden skateboards and three composite skateboards?

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SAT shortcut

subtract!

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SAT shortcut

subtract!

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[redacted]

5.	**(Challenge Level)** In one semester, Anne and Betty spent a combined 250 work hours in the tutoring lab. Anne spent 40 more hours in the lab and than Betty did. If one work day is 5 hours in the lab, how many days did Anne work in the tutoring lab ?	Grid-In:

a = anne
b = betty

$$a + b = 250$$
$$a = b + 40$$

5.	**(Challenge Level)** In one semester, Anne and Betty spent a combined 250 work hours in the tutoring lab. Anne spent 40 more hours in the lab and than Betty did. If one work day is 5 hours in the lab, how many days did Anne work in the tutoring lab ?	Grid-In: **29 days**

a = anne
b = betty

$$a + b = 250$$
$$a = b + 40 \quad \text{substitute}$$

$$a + b = 250$$
$$b + 40 + b = 250$$

$$2b + 40 = 250$$

$$2b = 210$$

$$b = 105,\ a = 145$$

5.	**(Challenge Level)** In one semester, Anne and Betty spent a combined 250 work hours in the tutoring lab. Anne spent 40 more hours in the lab and than Betty did. If one work day is 5 hours in the lab, how many days did Anne work in the tutoring lab ?	Grid-In: **29 days**

a = anne
b = betty

$$a + b = 250$$
$$a = b + 40 \quad \text{substitute}$$

$$a + b = 250$$
$$b + 40 + b = 250$$

$$2b + 40 = 250$$

$$2b = 210$$

$$b = 105,\ a = 145$$

SAT Mathematics Questions:

What is the question asking me to do?

What SAT category is the question?
{Algebra, Geometry, Statistics, Other}

What similar problems have I already solved ?

What method can I use ?

- Plug in a variable {x=2, for example}
- Plug in choices ABCD
- Eliminate extreme choices
- Estimate
- Use a shortcut
- Use your best Educated Guess

Time management is important: Do “easy & mid level” questions first. Skip challenging questions and word problems as you need to complete all 58 questions.

SAT Section 3 - Math

No calculators allowed

25 minutes to complete 20 questions

SAT Section 4 - Math

Use your calculator

55 minutes to complete 38 questions

A few Test-Taking Strategies

- Prepare in an organized way: Focus on ALGEBRA, GEOMETRY, COORDINATE PLANE, CHARTS & GRAPHS and STATISTICS lessons from Grades 9-10
- Be comfortable with the SAT Level of questions by exposure to as many practice questions as possible. The SAT is a patterned exam.
- Work on Time Management. Be sure to complete “easy to mid” level questions first.
- Some multiple choice questions can be solved by PLUG IN of the answer choices.
- Some multiple choice questions can be simplified by PLUG IN A VALUE for the variable (Plug in “1,2,3,4 or 5”)
- ESTIMATE the answer to save procedural time on questions.
- Study and MEMORIZE FORMULAS and SOLUTION METHODS before the exam.
- Look for SHORTCUTS

Strategies

Questions?

Comments?