

ALGEBRA 2

Workbook

Common Core Standards Edition

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**Common Core High School Math Reference Sheet
(Algebra I, Geometry, Algebra II)**

CONVERSIONS

1 inch = 2.54 centimeters	1 kilometer = 0.62 mile	1 cup = 8 fluid ounces
1 meter = 39.37 inches	1 pound = 16 ounces	1 pint = 2 cups
1 mile = 5280 feet	1 pound = 0.454 kilograms	1 quart = 2 pints
1 mile = 1760 yards	1 kilogram = 2.2 pounds	1 gallon = 4 quarts
1 mile = 1.609 kilometers	1 ton = 2000 pounds	1 gallon = 3.785 liters
		1 liter = 0.264 gallon
		1 liter = 1000 cubic centimeters

FORMULAS

Triangle	$A = \frac{1}{2}bh$	Pythagorean Theorem	$a^2 + b^2 = c^2$
Parallelogram	$A = bh$	Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Circle	$A = \pi r^2$	Arithmetic Sequence	$a_n = a_1 + (n - 1)d$
Circle	$C = \pi d$ or $C = 2\pi r$	Geometric Sequence	$a_n = a_1 r^{n-1}$
General Prisms	$V = Bh$	Geometric Series	$S_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$
Cylinder	$V = \pi r^2 h$	Radians	1 radian = $\frac{180}{\pi}$ degrees
Sphere	$V = \frac{4}{3}\pi r^3$	Degrees	1 degree = $\frac{\pi}{180}$ radians
Cone	$V = \frac{1}{3}\pi r^2 h$	Exponential Growth/Decay	$A = A_0 e^{k(t-t_0)} + B_0$
Pyramid	$V = \frac{1}{3}Bh$		

Test 1

Part I

Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. For each question, write on the space provided the numeral preceding the word or expression that best completes the statement or answers the question. [48]

1. Simplify $8i^6 + 6i^5 - 5i^3 - 3i^2 - 7i - 9$

- (1) $-14 + 4i$ (2) $-4 + 4i$ (3) $-10i$ (4) $-14 - 18i$ 1 _____

2. In a family with 3 children, what is the probability that they have 2 boys and 1 girl?

- (1) $\frac{3}{8}$ (2) $\frac{1}{4}$ (3) $\frac{1}{8}$ (4) $\frac{1}{2}$ 2 _____

3. Given that $(\sqrt[4]{x})^4 = x$, which of the following expressions is equivalent to $\sqrt[4]{x}$?

- (1) $x^{\frac{1}{4}}$ (2) $x^{\frac{1}{8}}$ (3) x^4 (4) $\frac{x}{4}$ 3 _____

4. Richard's wallet contains four \$1 bills, three \$5 bills, and one \$10 bill. If Richard randomly removes two bills without replacement, which of the following is true?

- (1) The probability the bills will total \$15 is greater than the probability that the bills will total \$2.
 (2) The probability the bills will total \$15 is less than the probability that the bills will total \$2.
 (3) The probability the bills will total \$15 is equal to the probability that the bills will total \$2.
 (4) The probability cannot be determined.

4 _____

5. Does the function $y = 4^{-2x}$ represent exponential growth or decay? What is the percent rate of change?

- (1) exponential growth; 4% (3) exponential growth; 83.5%
 (2) exponential decay; 93.75% (4) exponential decay; 6.25% 5 _____

6. Determine the points of intersection for $x^2 + y^2 = 1$ and $y = x + 1$.

- (1) $(0, -1)$ and $(1, 0)$ (3) $(1, 0)$ and $(0, 1)$
 (2) $(-1, 0)$ and $(0, 1)$ (4) $(-1, 0)$ and $(1, 1)$ 6 _____

7. Which equation has the same solutions as $(x - 5)^2 = -9$?

- (1) $x^2 - 10x = -34$ (3) $-2(x - 5)^2 = -18$
 (2) $2x^2 - 20x = -34$ (4) $(x - 5)^2 + 6 = 3$ 7 _____

Test 1

15. The concentration of a drug in milligrams in a medical patient's bloodstream is modeled by $f(x) = \frac{20}{t^2 + 1}$ where $t > 0$ is in hours and $f(x)$ is in milligrams per liter. The patient should not take a second dose until the concentration is no more than 2 milligrams per liter. What is the shortest time the patient should wait before taking a second dose?

- (1) 1.5 hours (2) 2 hours (3) 3 hours (4) 3.5 hours 15 ____

16. Movie Warehouse asked 1000 customers how they prefer to view movies. The results are summarized in the table below.

	DVD or BluRay	Netflix or similar provider	Online Downloads
Age Under 35	52	145	186
Age 35-55	108	110	56
Age over 55	250	75	18

To the nearest percent, what is the probability that a customer would prefer to view movies via online downloads given that they are under 35 years old?

- (1) 19% (2) 72% (3) 49% (4) 94% 16 ____

17. Sarah graphs the function $g(x) = 5x^2 + 30$ and observes that $g(x)$ has no x -intercepts. She uses this information to conclude that there are no solutions to the equation $5x^2 + 30 = 0$. To verify her conclusion, Sarah solves the equation $5x^2 + 30 = 0$ algebraically, and gets two solutions. Which statement is true about this situation?

- (1) Sarah's original conclusion was correct. There are no solutions to the equation $5x^2 + 30 = 0$. She made a mistake when solving the equation algebraically.
 (2) Sara's original conclusion was false. The equation has two complex solutions, $-6i$ and $6i$.
 (3) Sara's original conclusion was false because she graphed $g(x)$ incorrectly. The x -intercepts of $g(x)$ are $-\sqrt{6}$ and $\sqrt{6}$ and these values are also the solutions to the equation $5x^2 + 30 = 0$.
 (4) Sara's original conclusion was false. The equation has two complex solutions, $i\sqrt{6}$ and $-i\sqrt{6}$.

17 ____

18. A mathematics teacher has a box of 11 calculators—three that are defective and eight that are good. If two calculators are selected with replacement, what is the probability that they are both defective?

- (1) $\frac{9}{121}$ (2) $\frac{64}{121}$ (3) $\frac{3}{55}$ (4) $\frac{6}{11}$ 18 ____

19. Which of the following functions decreases as the input values approach both negative infinity and positive infinity?

- (1) $f(x) = x^3 - 4x^2 + x$ (3) $g(x) = -2x^3 - 4x^2 + 9$
 (2) $h(x) = x^4 - 4x^3 + 2x + 8$ (4) $r(x) = -x^4 + 9x^3 + x^2 + 8x + 2$ 19 ____

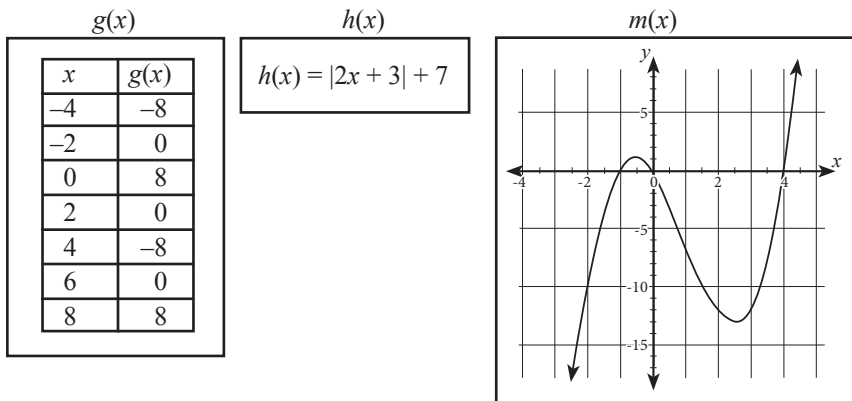
Test 1

23. Find the percent change to the nearest percent for the following

function: $f(x) = 2(1 - .3)^{-x}$

- (1) 30% (2) 43% (3) 70% (4) 60% 23 _____

24. Which of the three functions has the largest and smallest average rate of change from $x = -2$ to $x = 4$?



- (1) Largest: $h(x)$ Smallest: $m(x)$ (3) Largest: $g(x)$ Smallest: $m(x)$
 (2) Largest: $h(x)$ Smallest: $g(x)$ (4) Largest: $m(x)$ Smallest: $h(x)$ 24 _____

Part II

Answer all 8 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [16]

25. Monthly mortgage payments can be calculated according to the formula,

$A = \frac{Mp^n(1-p)}{(1-p^n)}$ where M is the size of the mortgage, n is the number of compounds per year, t is the length of the mortgage, in years, and $p = \left(1 + \frac{r}{n}\right)$

where r is the interest rate as a decimal. What would the monthly mortgage payments be on a \$180,000, 15 year mortgage with 6% interest, compounded monthly, to the nearest dollar?

Test 1

29. A randomized, controlled experiment is conducted in which the researcher is deciding if exercise has an impact on the number of days people are sick each year. The control group in the experiment is sick an average of 10 days per year with a standard deviation of 1.6 days. The experimental group is sick an average of 7.2 days a year with a standard deviation of 0.7 days.

If the standard deviation of the experimental group was 1.2 days instead of 0.7 days, would this increase or decrease the chance that there was a significant difference between the two groups? Explain your answer.

30. Katherine wants to construct a small box with a volume of 20 cubic inches with the following specifications. The length of a box is five more than its width. Its depth is one less than its width. What are the dimensions of the box in simplest radical form and rounded to *the nearest hundredth*? Only an algebraic solution will receive full credit.

31. The amount of money left on a loan that Kira owes her grandmothers is represented by the function $k(t) = 280(.88)^t$ where $k(t)$ represents the amount of money left on the loan and t represents the time, in years.

Identify $k(t)$ as a growth or decay and explain your answer.

Name A_0 , the starting amount and explain what it represents.

Find r , the percent change and explain what it represents.

Test 1

32. Solve the following equation and explain each step used in solving the equation.

$$\frac{3}{x-3} = \frac{1}{x-1} + \frac{7}{(x-1)(x-3)}$$

Part III

Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [7]

33. The chart below shows the average daily high temperature each month for Saugerties, NY.

Month	Average Daily High Temperature
1 (January)	34
2 (February)	38
3	48
4	62
5	73
6	81
7	85
8	82
9	74
10	63
11	51
12	39

Write a sine regression equation to model the average daily temperature as a function of the month of the year for Saugerties, New York. Round coefficients to *the nearest hundredth*.

Using your regression, what is the predicted average daily high in September?

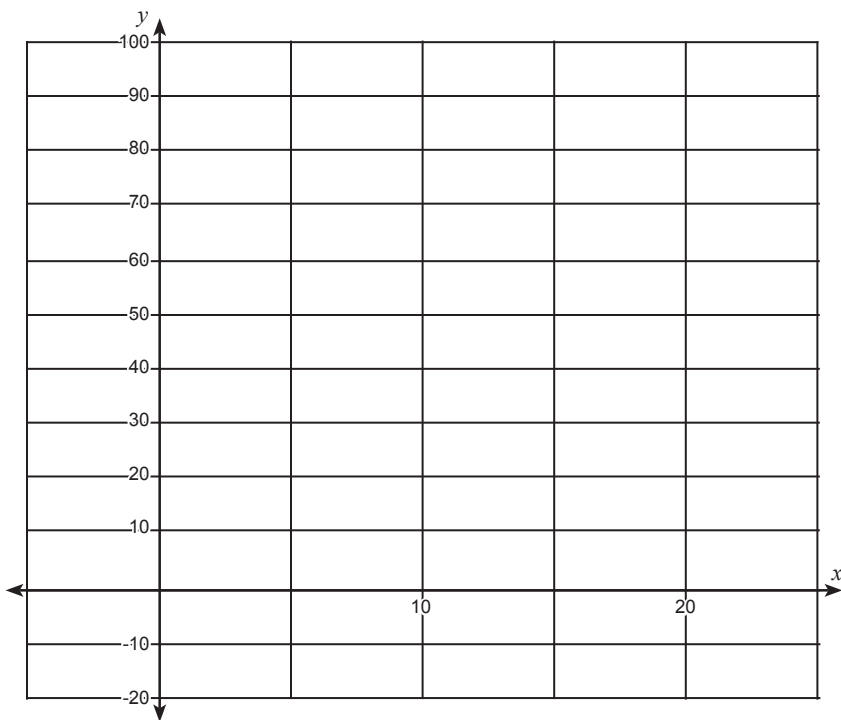
How far is this value from the actual value in the table?

Test 1
Part IV

Answer the question in this part. A correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [6]

37. The temperature, in Fahrenheit, in a small town in New York x months after January 1st can be modeled by the function, $y = -40\cos \frac{\pi}{6}x + 50$

Graph the function over the interval $0 \leq x \leq 24$ on the grid below. Identify the period, midline, and amplitude of the function, and label these values on the graph. Explain what each means in the context of the function.



**ALGEBRA 2
COMMON CORE**

**Correlation
of
Standards**

QUESTION	STANDARD		
	TEST 1	TEST 2	TEST 3
1	N.CN.1	A.SSE.2	F.IF.3
2	S.CP.1	F.TF.1	S.CP.3
3	N.RN.1	A.CED.1	S.IC.3
4	S.CP.2	A.SSE.4	N.RN.2
5	F.IF.8	S.IC.1	A.REI.2
6	A.REI.7	S.CP.7	A.REI.7
7	N.CN.7	N.CN.7	F.IF.9
8	F.BF.3	N.RN.1	S.ID.4
9	N.Q.2	S.IC.3	F.TF.8
10	F.TF.2	S.IC.6	N.CN.1
11	A.SSE.2	A.APR.2	A.REI.6
12	F.BF.1	F.IF.6	F.LE.5
13	A.APR.4	F.BF.3	S.CP.3
14	S.IC.4	S.CP.1	A.REI.4
15	A.CED.1	A.SSE.4	F.LE.4
16	S.CP.6	A.APR.6	S.ID.6
17	N.CN.7	S.ID.4	S.CP.1
18	S.CP.2	F.TF.5	A.APR.6
19	F.IF.7	S.CP.4	A.REI.1
20	S.IC.2	F.BF.2	A.APR.2
21	F.IF.4	F.LE.2	N.CN.2
22	G.GPE.2	S.CP.2	F.BF.2
23	F.IF.8	F.BF.1	F.BF.4
24	F.IF.9	F.IF.4	S.ID.6

QUESTION	STANDARD		
	TEST 1	TEST 2	TEST 3
25	A.SSE.4	N.CN.2	F.LE.2
26	A.REI.4	F.BF.4	A.APR.6
27	S.IC.6	F.LE.2	A.SSE.2
28	F.LE.5	N.RN.1	A.REI.4
29	S.IC.5	S.IC.1	F.IF.4
30	A.APR.3	F.IF.7	N.CN.2
31	F.IF.8	F.IF.7	F.IF.6
32	A.REI.1	A.REI.4	S.CP.4
33	S.ID.6	S.IC.4	A.REI.1
34	F.TF.2	A.REI.6	F.IF.7
35	S.CP.4	A.REI.1	F.BF.3
36	A.APR.6	A.APR.4	F.IF.4
37	F.IF.7	F.IF.7	S.ID.6

QUESTION	STANDARD		
	TEST 4	TEST 5	TEST 6
1	F.BF.3	A.SSE.3	S.CP.4
2	N.RN.2	F.IF.8	F.IF.3
3	A.REI.4	S.CP.1	A.CED.1
4	S.CP.4	A.CED.1	F.TF.2
5	N.CN.2	S.ID.4	A.APR.2
6	S.IC.3	A.REI.11	A.REI.4
7	F.BF.1	A.REI.7	S.CP.2
8	A.CED.1	N.CN.2	F.IF.6
9	S.IC.1	F.BF.3	S.CP.7
10	S.CP.7	A.REI.11	N.CN.1
11	F.BF.3	S.CP.3	F.IF.8
12	F.IF.8	A.APR.2	F.LE.4
13	F.BF.2	A.REI.2	G.GPE.2
14	N.CN.7	S.ID.6	F.BF.3
15	F.LE.4	A.REI.4	F.TF.3
16	S.ID.4	S.IC.2	N.CN.2
17	G.GPE.2	F.IF.6	A.APR.3
18	F.TF.1	S.CP.7	S.CP.5
19	S.ID.6	A.REI.7	S.ID.4
20	N.RN.2	F.BF.2	S.IC.4
21	F.BF.4	A.APR.3	A.REI.2
22	S.CP.5	N.RN.2	F.BF.4
23	A.REI.2	S.ID.4	F.BF.1
24	A.REI.1	G.GPE.2	S.IC.2

QUESTION	STANDARD		
	TEST 4	TEST 5	TEST 6
25	A.REI.7	N.CN.1	A.REI.6
26	F.TF.5	S.IC.3	S.ID.6
27	A.CED.1	F.LE.2	A.SSE.2
28	S.IC.6	S.CP.5	F.BF.1
29	A.APR.2	F.BF.1	S.CP.4
30	A.REI.1	A.REI.2	F.BF.2
31	F.IF.7	F.BF.4	S.IC.5
32	F.TF.8	S.CP.2	N.Q.2
33	A.SSE.4	F.IF.6	A.APR.3
34	A.REI.2	A.APR.3	A.SSE.3
35	S.ID.6	F.LE.2	F.IF.4
36	A.APR.3	A.REI.4	A.APR.4
37	F.IF.7	F.IF.7	F.IF.7

STANDARD	TEST 1	TEST 2	TEST 3
A.APR.2			
A.APR.3	30		
A.APR.4	13	36	
A.APR.6	36	16	18, 26
A.CED.1	15	3	
A.REI.1	32	35	
A.REI.2			5
A.REI.4	26	32	14, 28
A.REI.6		34	11
A.REI.7	6		6
A.REI.11			19, 33
A.SSE.2	11	1	27
A.SSE.3	33		
A.SSE.4	25	4	
F.BF.1	12	23	
F.BF.2		20	22
F.BF.3	8	13	35
F.BF.4		26	23
F.IF.3			1
F.IF.4	21	24	29, 36
F.IF.6		12	31
F.IF.7	19, 37	30, 31, 37	34
F.IF.8	5, 31		
F.IF.9	24		7
F.LE.2		21, 27	25
F.LE.4			15
F.LE.5	28		12

STANDARD	TEST 4	TEST 5	TEST 6
A.APR.2	29	12	5
A.APR.3	36	21, 34	33, 17
A.APR.4			36
A.APR.6			
A.CED.1	8, 27	4	3
A.REI.1	24, 30		
A.REI.2	23, 34	13, 30	21
A.REI.4	3	15, 36	6
A.REI.6			25
A.REI.7	25	7, 19	
A.REI.11	15	6, 10	
A.SSE.2			27
A.SSE.3		1	34
A.SSE.4	33		
F.BF.1	7	29	23
F.BF.2	13	20	30
F.BF.3	1, 11	9	14
F.BF.4	21	31	22
F.IF.3			2
F.IF.4			35
F.IF.6		17, 33	8
F.IF.7	31, 37	37	37
F.IF.8	12	2	11
F.IF.9			
F.LE.2		27, 35	
F.LE.4			12
F.LE.5			

STANDARD	TEST 1	TEST 2	TEST 3
F.TF.1		2	
F.TF.2	10, 34		
F.TF.3			
F.TF.5		18	
F.TF.8			9
G.GPE.2	22		
N.CN.1	1		10
N.CN.2		25	21, 30
N.CN.7	7, 17	7	
N.Q.2	9		
N.RN.1	3	8, 28	
N.RN.2	23		4
S.CP.1	2	14	17
S.CP.2	4, 18	22	
S.CP.3			2, 13
S.CP.4	35	19	32
S.CP.5			
S.CP.6	16		
S.CP.7		6	
S.IC.1		5, 29	
S.IC.2	20		
S.IC.3		9	3
S.IC.4	14	33	
S.IC.5	29		
S.IC.6	27	10	
S.ID.4		17	8
S.ID.6	33		16, 24, 37

STANDARD	TEST 4	TEST 5	TEST 6
F.TF.1	18		
F.TF.2			4
F.TF.3			15
F.TF.5	26		
F.TF.8	32		
G.GPE.2	17	24	13
N.CN.1		25	10
N.CN.2	5	8	16
N.CN.7	14		
N.Q.2			32
N.RN.1			
N.RN.2	2, 20	22	
S.CP.1		3	
S.CP.2		32	7
S.CP.3		11	
S.CP.4	4		1, 29
S.CP.5	22	28	18
S.CP.6			
S.CP.7	10	18	9
S.IC.1	9		
S.IC.2		16	24
S.IC.3	6	26	
S.IC.4			20
S.IC.5			31
S.IC.6	28		
S.ID.4	16	5, 23	19
S.ID.6	19, 35	14	6