BEFORE THE 5 DECEMBER SAT

Lesson 1 Worksheet.

Algebra and Advanced Math, at hard Module 2 level.

INSIDE

- 20 questions on every skill from Lesson 1
- Shifted roots, tables with a shift, perpendicular lines
- Infinitely many and no-solution systems
- Exponential rewrites, projectiles, equivalent fractions
- Five questions where Desmos lies or loses time
- Last 4: the same skills in disguise
- Answer key with the call: Desmos, hand, or both
- Full solutions: Desmos lines and hand steps

HOW TO USE IT

1. Give yourself 50 minutes. No notes.
2. Before each question, tick Desmos, Hand or Both.
3. Tick Sure, 50/50 or Guess after each answer.
4. Mark with the key. Redo every wrong one before reading its solution.

These are harder than most questions you will see on test day, on purpose. If one takes you longer than 3 minutes, mark it and move on, just like the real test.

1 MODULE 2 LEVEL

My answer

Each solution of $x^2 + bx + c = 0$ is 4 less than twice a solution of $x^2 - 7x + 3 = 0$, where b and c are constants. What is the value of $b + c$?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

2 MODULE 2 LEVEL

My answer

For the quadratic function f, the table shows three values of x and their corresponding values of $f(x) - 23$.

x	$f(x) - 23$
4	54
9	79
15	-23

What is the y-coordinate of the y-intercept of the graph of $y = f(x)$ in the xy-plane?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

3 MODULE 2 LEVEL

My answer

In the xy-plane, line ℓ has slope m, where $m < -1$, and passes through the point $(-2,\ 7)$. Line k is perpendicular to line ℓ and also passes through the point $(-2,\ 7)$. Which of the following points lies on line k?

(A) $(-1,\ 7+m)$

(B) $(-2+m,\ 6)$

(C) $(-2-m,\ 6)$

(D) $(-1,\ 7-m)$

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

4 MODULE 2 LEVEL

My answer

$$5x^2 - 30x + 17 = 0$$

One solution to the given equation can be written as $3 + \frac{\sqrt{k}}{5}$, where k is a constant. What is the value of k?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

5 MODULE 2 LEVEL

My answer

$$\frac{1}{2}y = 2 - \frac{a}{6}x$$
$$\frac{4}{5}x + \frac{b}{5}y = \frac{a}{5} + \frac{1}{5}x$$

In the given system of equations, a and b are constants and $a > 0$. The system has infinitely many solutions. What is the value of $a + b$?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

6 MODULE 2 LEVEL

My answer

$$(k + 3)x - 12y = 5k$$
$$4x - 9 = (k - 5)y$$

In the given system of equations, k is a constant and $k > 0$. If the system has no solution, what is the value of k?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

7 MODULE 2 LEVEL

My answer

The function f is defined by $f(x) = 500(2.9)^{\frac{x}{5}}$. It can be rewritten as $f(x) = 500\left(1 + \frac{k}{100}\right)^{x}$, where k is a constant. What is the value of k, rounded to the nearest tenth?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

8 MODULE 2 LEVEL

My answer

A quadratic function models the height, in feet, of an object above the ground in terms of the time, in seconds, after the object is launched off an elevated surface. The model indicates the object hits the ground 17 seconds after being launched; the object reaches its maximum height of 1,296 feet above the ground 8 seconds after being launched. Based on the model, at what time after the object is launched, in seconds, does the object first reach a height of 1,215 feet?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

9 MODULE 2 LEVEL

My answer

$$\frac{ax}{x+2} + \frac{5}{3x-b} = \frac{12x^2 - 7x + 4b - 2}{(x+2)(3x-b)}$$

The equation above is true for all values of x where $x \neq -2$ and $x \neq \frac{b}{3}$, and a and b are constants. What is the value of $a + b$?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

10 MODULE 2 LEVEL

My answer

$$y = 2x^2 - 3x + 5$$
$$y = 5x + k$$

In the given system of equations, k is a constant. The graphs of the equations in the xy-plane intersect at exactly one point. What is the value of k?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

11 MODULE 2 LEVEL

My answer

$$3(p+2k)(x-4)-(4-x)^2=3(5p+2k)(x-4)$$

In the given equation, p and k are constants, and the equation has exactly two distinct real solutions. If the sum of the solutions is -40, what is the value of p?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

12 MODULE 2 LEVEL

My answer

The function h is defined by

$$h(x)=-\sqrt{2x^3-bx+c},$$

where b and c are constants. In the xy-plane, the graph of $y=h(x)$ contains the points $(3,\ 0)$ and $\left(0,\ -\sqrt{60}\right)$. If $h(k)=0$, what is the least possible value of k?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

13 MODULE 2 LEVEL

My answer

$$g(x) = 4(x - d)(x - e)^2(x - f)$$

The function g is defined by the given equation, where d, e, and f are distinct constants. When $x < d$, the value of $g(x)$ is positive, and when $d < x < e$, the value of $g(x)$ is negative. The graph of $y = g(x)$ in the xy-plane contains the point $(p,\ q)$, where p and q are constants. If $q = -5$, which of the following could be true?

I. $e < p < f$
II. $d < p < e$
III. $f < p$

(A) I only
(B) II only
(C) I and II only
(D) I, II, and III

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

14 MODULE 2 LEVEL

My answer

If a is a positive integer, which of the following is a factor of $6x^2 + (2a - 9)x - 3a$?

(A) $3x - a$
(B) $2x + 3$
(C) $3x + a$
(D) $2x + a$

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

15 MODULE 2 LEVEL

My answer

The quadratic function h is defined by $h(x) = ax^2 + bx + c$, where a, b, and c are constants and $a \neq 0$. It is given that $h(-7) < 0$, $h(1) > 0$, and $h(13) < 0$. Which of the following could NOT be the x-coordinate of the vertex of the graph of $y = h(x)$?

(A) -4

(B) -2

(C) 3

(D) 6

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

16 MODULE 2 LEVEL

My answer

$$f(x) = 6x^{11} - 4x^7 + x^3$$
$$g(x) = -3x^9 + 8x^5 - 2x^4$$

The polynomial $p(x)$ is the product of the given polynomials $f(x)$ and $g(x)$. What is the coefficient of x^{16} in $p(x)$?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

17 SAME SKILL, NEW DISGUISE

My answer

In the xy-plane, line ℓ passes through the points $(2,\ 5)$ and $(k,\ 1)$, and line m is the graph of $kx + 2y = 3$, where k is a positive constant. If lines ℓ and m have no points in common, what is the value of k?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

18 SAME SKILL, NEW DISGUISE

My answer

A drone's altitude, in meters, relative to the roof of a 75-meter-tall building is modeled by a quadratic function of the time t, in seconds, after a test flight begins. Negative values mean the drone is below the roof.

t	altitude relative to roof
2	-12
5	0
9	-96

Based on the model, what is the drone's greatest height above the ground, in meters?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

19 SAME SKILL, NEW DISGUISE

My answer

In the xy-plane, the graph of $ax + 12y = b + 2a$, where a and b are constants, is the same line as the line that passes through the points $(2,\ 1)$ and $(-4,\ 5)$. What is the value of b?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

20 SAME SKILL, NEW DISGUISE

My answer

The value of a rare coin increased by 44% every 2 years from 2014 to 2024. If the value increased by the same percent every 6 months during this period, what was that percent increase, to the nearest tenth of a percent?

Your answer

Decide first: ☐ Desmos ☐ Hand ☐ Both How sure? ☐ Sure ☐ 50/50 ☐ Guess

WORKING

ANSWER KEY

All 20 answers, and the call.

The call is the fastest safe route. “Hand” on a question means Desmos lies there or loses you time.

#	ANSWER	CALL	SKILL
Q1	−34	BOTH	Shifted roots
Q2	−15	DESMOS	Table with a shift
Q3	B	DESMOS	Perpendicular lines with a letter
Q4	140	BOTH	Quadratic formula form
Q5	7.5	DESMOS	Infinitely many solutions
Q6	9	DESMOS	No solution
Q7	23.7	DESMOS	Exponential rewrite
Q8	5.75	DESMOS	Projectile model
Q9	7	BOTH	Equivalent rational expressions
Q10	−3	DESMOS	One point of intersection
Q11	4	DESMOS	Sum of solutions with two letters
Q12	−5	HAND	Radical function, hidden zeros
Q13	C	HAND	Sign reading with a double zero
Q14	C	HAND	Factor with a letter
Q15	A	HAND	Vertex from signs
Q16	60	HAND	Coefficient of a product
Q17	4	BOTH	Disguise · parallel lines
Q18	79	DESMOS	Disguise · table with a shift
Q19	12	BOTH	Disguise · same line
Q20	9.5	DESMOS	Disguise · exponential rate

MARK YOURSELF

Count your score, then count your “Sure” answers that were wrong. Those are the ones that cost points on test day. Fix them first.

SOLUTIONS

How to get each one.

Q1

−34

BOTH

If $s = 2r - 4$, then $r = \dfrac{s+4}{2}$. So every new solution s makes $f\left(\dfrac{x+4}{2}\right) = 0$, where $f(x) = x^2 - 7x + 3$.

DESMOS LINES

$f(x) = x^2 - 7x + 3 \cdot x_1 = [1, 2, 3] \cdot 4f\left(\frac{x_1+4}{2}\right) \sim x_1^2 + bx_1 + c \to b = -6,\ c = -28$

By hand: $r_1 + r_2 = 7$ and $r_1 r_2 = 3$. New sum $= 2(7) - 8 = 6$, so $b = -6$. New product $= (2r_1 - 4)(2r_2 - 4) = 4(3) - 8(7) + 16 = -28$, so $c = -28$. $b + c = -34$.

Got 62? You used $2r + 4$. "4 less than twice" is $2r - 4$.

Q2

−15

DESMOS

The table gives $f(x) - 23$, so $f(x)$ is each table value plus 23. Fit a quadratic to f, not to the table.

DESMOS LINES

$x_1 = [4, 9, 15] \cdot y_1 = [54, 79, -23] \cdot y_1 + 23 \sim ax_1^2 + bx_1 + c \to c = -15$

By hand you would solve three equations in a, b, c: correct, but about three minutes. The regression takes twenty seconds.

Got −38? That is the y-intercept of $y = f(x) - 23$. Read the last line twice.

Q3

B

DESMOS

Line k has slope $-\dfrac{1}{m}$. Any point on k must give that slope with $(-2,\ 7)$.

DESMOS LINES

Pick a legal value, $m = -2$. Graph $y - 7 = \frac{1}{2}(x + 2)$ and the four points with $m = -2$: only $(-4,\ 6)$ sits on the line.

By hand: from $(-2,\ 7)$ to $(-2 + m,\ 6)$ the slope is $\dfrac{6-7}{m} = -\dfrac{1}{m}$. A has slope m (that is line ℓ), C has slope $\dfrac{1}{m}$, D has slope $-m$.

Picked C? One sign slip turns $-\frac{1}{m}$ into $\frac{1}{m}$. Test with a number.

Q4

140

BOTH

Desmos gives decimals, the answer wants an exact k. Use Desmos for the root, then undo the form.

DESMOS LINES

$r = \frac{30+\sqrt{900-340}}{10} \cdot (5(r-3))^2 \to 140$

By hand: $x = \dfrac{30 \pm \sqrt{900-340}}{10} = 3 \pm \dfrac{\sqrt{560}}{10}$, and $\dfrac{\sqrt{560}}{10} = \dfrac{\sqrt{560/4}}{5} = \dfrac{\sqrt{140}}{5}$. So $k = 140$.

Got 560? The denominator must be 5, not 10. **Got 35?** You wrote $\sqrt{140} = 2\sqrt{35}$ and dropped the 2.

Q5

7.5

DESMOS

Infinitely many solutions means one equation is exactly t times the other, numbers included. The letter a sits in a number term, so keep the numbers in.

DESMOS LINES

$x_1 = [1,2,3] \cdot y_1 = [1,-1,2] \cdot \frac{a}{6}x_1 + \frac{1}{2}y_1 - 2 \sim t\left(\frac{4}{5}x_1 + \frac{b}{5}y_1 - \frac{a}{5} - \frac{1}{5}x_1\right)\{a > 0\} \to a = 6,\ b = 1.5$

By hand: rewrite as $\frac{a}{6}x + \frac{1}{2}y = 2$ and $\frac{3}{5}x + \frac{b}{5}y = \frac{a}{5}$. Same ratio everywhere: $\dfrac{a/6}{3/5} = \dfrac{2}{a/5}$ gives $a^2 = 36$, so $a = 6$. Then $\dfrac{1/2}{b/5} = \dfrac{5}{3}$ gives $b = \dfrac{3}{2}$. $a + b = 7.5$ (or $15/2$).

Got −7.5? You took $a = -6$; the question says $a > 0$. **Wrong b?** You left $\frac{1}{5}x$ on the right side.

Q6

9

DESMOS

No solution means parallel lines: the x and y parts are in the same ratio, the numbers are not. Bring x and y to one side first.

DESMOS LINES

$[(k+3)x_1 - 12y_1,\ 4x_1 - (k-5)y_1] \sim [0,0]\{x_1 > 0\} \to k = 9$. Then check the numbers: ratio is $\frac{12}{4} = 3$, numbers give $\frac{45}{9} = 5$. Not equal, so no solution.

By hand: $\dfrac{k+3}{4} = \dfrac{-12}{-(k-5)}$, so $(k+3)(k-5) = 48$, $k^2 - 2k - 63 = 0$, $k = 9$ or $k = -7$. Only 9 is positive.

Got −7? It also makes parallel lines, but the question says $k > 0$.

Q7

23.7

DESMOS

$(2.9)^{x/5} = \left(2.9^{1/5}\right)^{x}$. The growth per 1 unit is the fifth root of 2.9, not 2.9 split into five.

DESMOS LINES

$100\left(2.9^{\frac{1}{5}} - 1\right) \to 23.731\ldots \to 23.7$

By hand you need a fifth root, so this one is a Desmos job. Round only at the very end.

Got 38.0? You divided the 190% growth by 5. Growth compounds; it does not split evenly.

Q8

5.75

DESMOS

Maximum at $t = 8$ with height 1,296 gives vertex form $h(t) = a(t-8)^2 + 1296$. The ground point fixes a.

DESMOS LINES

$x_1 = [17] \cdot y_1 = [0] \cdot y_1 \sim a(x_1 - 8)^2 + 1296 \to a = -16$. Graph $y = a(x-8)^2 + 1296$ and $y = 1215$, tap the left intersection: $x = 5.75$.

By hand: $81a = -1296$, $a = -16$. $1215 = 1296 - 16(t-8)^2$ gives $(t-8)^2 = \frac{81}{16}$, $t = 8 \pm \frac{9}{4}$: 5.75 or 10.25. "First" means 5.75.

Got 10.25? That is the second time, on the way down.

Q9

7

BOTH

"True for all x" means the two sides are the same expression. Clear the denominators and match coefficients.

DESMOS LINES

$x_1 = [1, 2, 4, 5, 6] \cdot ax_1(3x_1 - b) + 5(x_1 + 2) \sim 12x_1^2 - 7x_1 + 4b - 2 \to a = 4,\ b = 3$

By hand: $ax(3x - b) + 5(x + 2) = 3ax^2 + (5 - ab)x + 10$. Match: $3a = 12$ so $a = 4$; $5 - ab = -7$ so $ab = 12$ and $b = 3$. Check: $4b - 2 = 10$ ✓. $a + b = 7$.

Got a mess? You probably fitted the raw fractions with too few points. Multiply out first, it is safer.

Q10

−3

DESMOS

Set them equal: $2x^2 - 8x + 5 = k$. One intersection means k is the minimum of $2x^2 - 8x + 5$, the vertex.

> **DESMOS LINES**
> Graph $y = 2x^2 - 8x + 5$, tap the vertex: $(2,\ -3)$. So $k = -3$.

By hand: $2x^2 - 8x + (5 - k) = 0$ and the discriminant is $64 - 8(5 - k) = 0$, so $k = -3$.

Got 3? A sign slip when moving k across.

Q11

4

DESMOS

Two solutions with sum -40 sit around their middle, -20. Call the larger one u; the other is $-40 - u$.

> **DESMOS LINES**
> $F(x) = 3(p + 2k)(x - 4) - (4 - x)^2 - 3(5p + 2k)(x - 4) \cdot [F(u), F(-40 - u)] \sim [0, 0]\{u > -20\}$
> $\rightarrow p = 4$

By hand: put $w = x - 4$, so $(4 - x)^2 = w^2$. Then $3(p + 2k)w - w^2 = 3(5p + 2k)w$ gives $w^2 + 12pw = 0$: $w = 0$ or $w = -12p$. So $x = 4$ or $x = 4 - 12p$. Sum $8 - 12p = -40$, $p = 4$. (k cancels.)

Got a different p? Without $\{u > -20\}$ Desmos can land on the wrong pair. Always give it the condition.

Q12

−5

HAND

Desmos lies here. The fit $y_1 \sim -\sqrt{2x_1^3 - bx_1 + c}$ returns $b \approx 27.2$ and $c \approx 27.7$, with no warning. Both are wrong. Find b and c by hand.

> **DESMOS**
> After you have b and c, Desmos is fine: graph $y = 2x^3 - 38x + 60$ and read the zeros.

By hand: $h(0) = -\sqrt{c} = -\sqrt{60}$, so $c = 60$. $h(3) = 0$: $54 - 3b + 60 = 0$, so $b = 38$. Then $2x^3 - 38x + 60 = 2(x - 3)(x^2 + 3x - 10) = 2(x - 3)(x - 2)(x + 5)$. Zeros $-5,\ 2,\ 3$. Least: -5.

Got 2 or 3? You stopped at the zeros near the given point. A cubic can have three.

Q13

C

HAND

The squared factor $(x-e)^2$ never changes sign, so g only switches sign at d and f. The leading number is positive and the degree is 4, so g is positive far left and far right.

> **DESMOS**
> Check a sample: graph $4(x+1)(x-1)^2(x-3)$ with $d=-1, e=1, f=3$ and see where $y<0$.

By hand: g is negative right after d and stays negative through e (no switch there) until f. If f were between d and e, g would turn positive before e, so the order is $d<e<f$. $g(p)=-5<0$ means $d<p<f$ with $p\neq e$: I and II could be true, III gives a positive value.

Picked B? You flipped the sign at e. A squared factor touches zero but does not cross.

Q14

C

HAND

Group it: $6x^2-9x+2ax-3a=3x(2x-3)+a(2x-3)=(3x+a)(2x-3)$.

> **DESMOS**
> Desmos cannot test "for a positive integer a" directly. You could set $a=1$ and look for the zeros $-\frac{1}{3}$ and $\frac{3}{2}$, then match: only $3x+a$ gives $-\frac{a}{3}$.

By hand: $(3x+a)(2x-3)$. Check the others with their zeros: $3x-a$ works only if $a=4.5$, $2x+3$ only if $a=4.5$, $2x+a$ only if $a=0$ or $a=-3$. None is a positive integer.

Picked A? One sign slip. Plug $x=-\frac{a}{3}$ back in to check.

Q15

A

HAND

Minus, plus, minus: the parabola opens down, with one zero between -7 and 1 and one between 1 and 13.

> **DESMOS**
> No equation to type. This is a two-line sketch.

The vertex is the average of the zeros, so it lies between $\frac{-7+1}{2}=-3$ and $\frac{1+13}{2}=7$. -4 is outside. The others work: -2 (zeros $-6, 2$), 3 (zeros $-1, 7$), 6 (zeros $0, 12$).

Picked D? 6 looks far, but zeros 0 and 12 fit every condition.

Q16

60

HAND

Only pairs of powers that add to 16 matter. Desmos with powers near 20 rounds badly, and expanding takes minutes.

> **DESMOS**
> No Desmos. Pair the powers.

By hand: $11 + 5$: $6 \cdot 8 = 48$. $7 + 9$: $(-4)(-3) = 12$. $3 + 13$: no x^{13} term. Total $48 + 12 = 60$.

Got 36? $(-4)(-3)$ is $+12$. **Got 48?** You missed the second pair.

Q17

4

BOTH

No points in common = a no-solution system in disguise: same slope, different lines. Slope of ℓ is $\frac{1-5}{k-2} = \frac{-4}{k-2}$; slope of m is $-\frac{k}{2}$.

> **DESMOS LINES**
> Let x play k: graph $y = \frac{-4}{x-2}$ and $y = -\frac{x}{2}$. They cross at $x = -2$ and $x = 4$. $k > 0$, so $k = 4$.

By hand: $\frac{-4}{k-2} = -\frac{k}{2}$ gives $k^2 - 2k - 8 = 0$, $k = 4$ or $k = -2$. Check $k = 4$: ℓ is $y = -2x + 9$, m is $y = -2x + 1.5$. Parallel and different, so no common point.

Got −2? Parallel too, but k must be positive.

Q18

79

DESMOS

Same move as Q2: the table is shifted. Fit the table, find the maximum, then add the 75 meters back.

> **DESMOS LINES**
> $x_1 = [2, 5, 9] \cdot y_1 = [-12, 0, -96] \cdot y_1 \sim ax_1^2 + bx_1 + c$. Graph $y = ax^2 + bx + c + 75$ and tap the vertex: $(4,\ 79)$.

By hand: the fit is $-4t^2 + 32t - 60$, with vertex at $t = 4$: $-64 + 128 - 60 = 4$ meters above the roof, so $75 + 4 = 79$.

Got 4? That is above the roof, not above the ground.

Q19

12

BOTH

"The same line" = infinitely many solutions in disguise. First find the second line: slope $-\frac{2}{3}$ through $(2,\ 1)$ gives $2x + 3y = 7$.

> **DESMOS LINES**
> $x_1 = [1, 2, 3] \cdot y_1 = [1, -1, 2] \cdot ax_1 + 12y_1 - b - 2a \sim t(2x_1 + 3y_1 - 7) \to b = 12$

By hand: $ax + 12y = b + 2a$ must be t times $2x + 3y = 7$. From $12 = 3t$, $t = 4$, so $a = 8$ and $b + 2a = 28$, so $b = 12$.

Got 28? That is $b + 2a$, the whole number term. **Got 7?** You forgot to scale by $t = 4$.

Q20

9.5

DESMOS

Same move as Q7. Every 2 years the value is multiplied by 1.44. Two years is four 6-month periods, so each period multiplies by $1.44^{1/4}$.

> **DESMOS LINES**
> $100\left(1.44^{\frac{1}{4}} - 1\right) \to 9.544\ldots \to 9.5$

By hand: $1.44^{1/4} = \sqrt{\sqrt{1.44}} = \sqrt{1.2} \approx 1.0954$, so about 9.5%.

Got 11.0? You split 44% into four. **Got 20.0?** That is the yearly rate, not the 6-month rate.

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