REAL QUESTIONS · OCTOBER 2026 SAT

The October SAT's hardest math. All solved.

The tough ones from my Day 61 to Day 70 videos. Every question worked out step by step in plain words, the Desmos moves I use, and **the trap** each one is built to catch you with.

HOW TO USE IT

Try each question **before** you scroll to my working. Getting it wrong first is what makes it stick.

A NOTE BEFORE YOU START

These are real questions from the October SAT, the ones that cost people the most points. Not because the math is crazy. Because each one hides a trap, and the trap looks like the answer.

So for every question you get my full working, written the way I'd explain it to you on a call, and the exact wrong answer it wants you to pick.

Tan

ON EVERY QUESTION

The real question

Exactly as it was on the test. Try it on paper first.

My full working

One step at a time, plus the Desmos screen where I use it.

The trap

The wrong answer built to catch you, so it can't catch you twice.

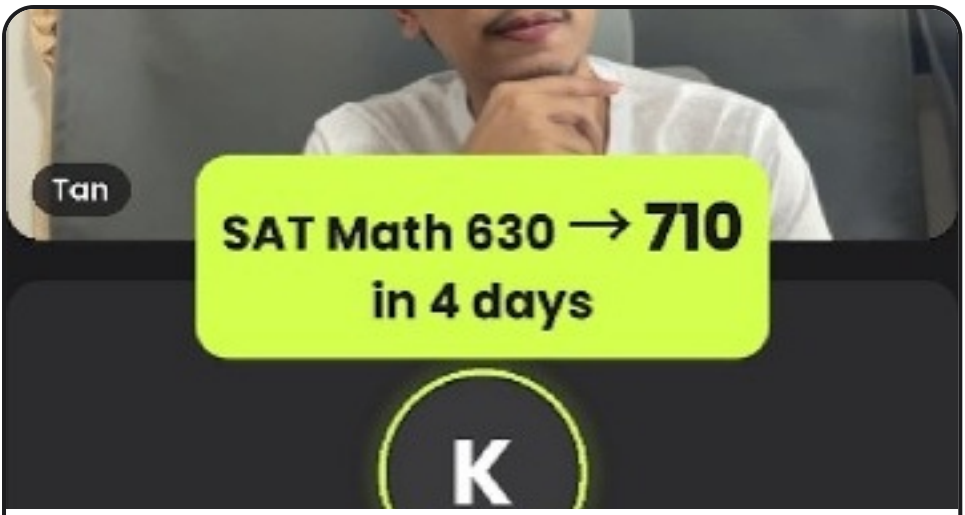


Hi, I'm Tan

In grade 4 I needed extra math every day. Then I got an 800.

In grade 4, I was so weak at math that my teacher kept me after school for extra lessons, **every single day**. That kid later taught himself to an SAT Math 800, and has spent the last two years tutoring students 1-on-1, from "what is 2 minus 5?" to 750s.

So **I get it**. Wherever math broke for you, we go back there and build up, **at your pace**.



630 → 710 in 4 days

"I never would've been able to do it without you."

Watch Keertana's testimonial →

A FEW STUDENTS WHO PUT THIS TO WORK

Shared with permission. Every score and quote below is real.

630 → 710

Keertana

“I just checked my score and hit 710 in math.” Four days of lessons before her test.

580 → 750

Mossy

“Thank you so much for teaching me so well, bro.” Stuck at 580–620 for months after a big-name prep course.

650 → 710

Alisa

“Hit my target, 710! You teach SO well.” Two weeks after we started.

01

ALGEBRA

No solution? Match the slopes.

$$18x + 6y = 8y + 9$$
$$ty = \frac{1}{5} + 9x$$

In the given system of equations, t is a constant. If the system has no solution, what is the value of t?

Grid-in: you type the answer, there are no choices.

Try it first. *My working is on the next page.*

01

MY WORKING · 1 OF 3

No solution? Match the slopes.

THE KEY IDEA

Two lines with **no solution** never cross. Lines that never cross are **parallel**, so they have the **same slope**.

1. First line. Get x and y on the same side: move the $8y$ over to the left.

$$18x + 6y - 8y = 9$$

$$18x - 2y = 9$$

2. Second line. Move the $9x$ to the left too, so both lines look the same way.

$$-9x + ty = \tfrac{1}{5}$$

3. Two lines have the same slope when their x-numbers and their y-numbers come in the **same ratio**. So the x-numbers over each other equal the y-numbers over each other.

$$\frac{18}{-9} = \frac{-2}{t}$$

My working continues on the next page ↓

01

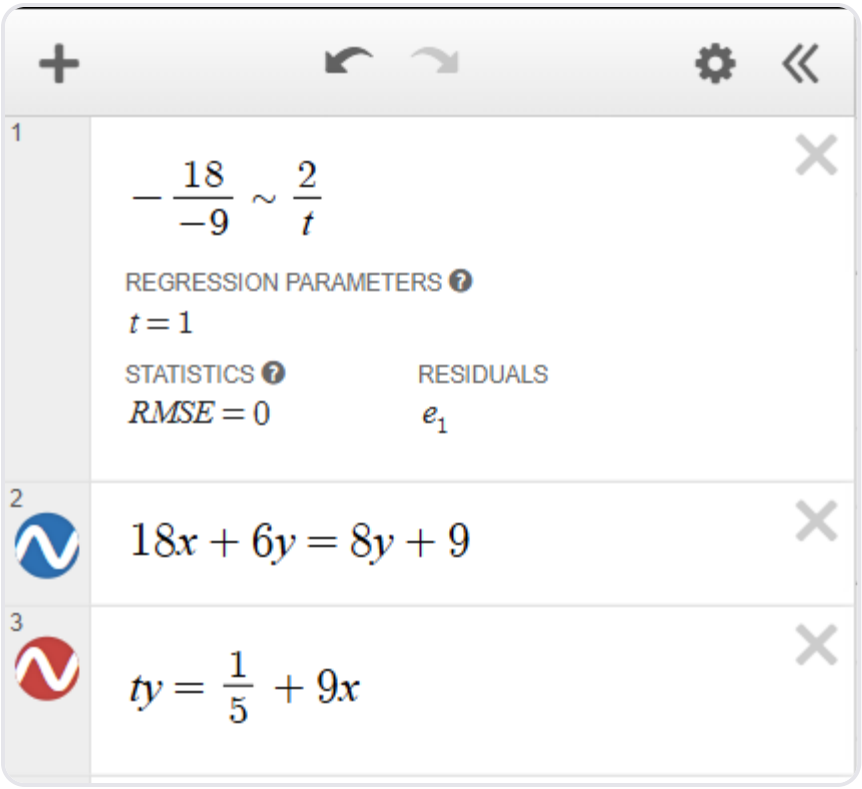
MY WORKING · 2 OF 3

No solution? Match the slopes.

4 Type it into Desmos with a tilde and it solves for t. (I flipped both signs, which doesn't change anything.)

$$-\frac{18}{-9} \sim \frac{2}{t} \quad \Rightarrow \quad t = 1$$

5 Quick check. With $t = 1$ the lines are $y = 9x - 4.5$ and $y = 9x + 0.2$. Same slope, different starting points. Parallel, so no solution.



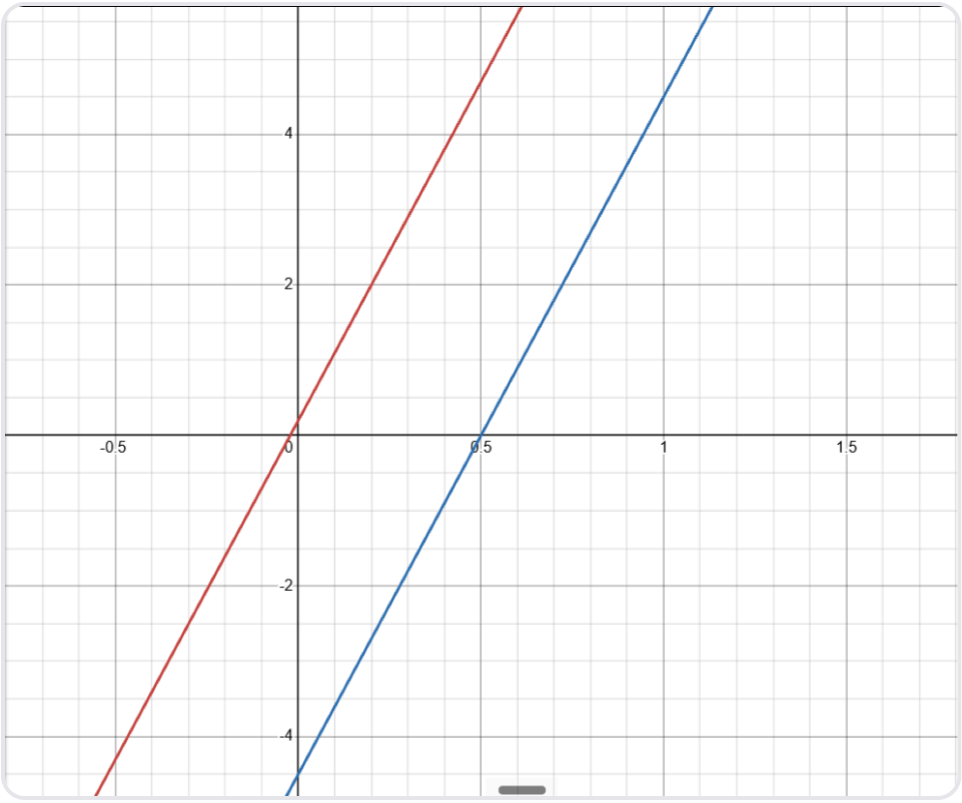
FROM THE VIDEO The tilde line gives $t = 1$.

My working continues on the next page ↓

01

MY WORKING · 3 OF 3

No solution? Match the slopes.



FROM THE VIDEO Both lines on the graph: same slope, never touching. Parallel, so no solution.

THE TRAP

If the y-intercepts matched too, it would be the **same line**, and that means infinitely many solutions, not none. Always check the intercepts are different.

ANSWER $t = 1$

02

ALGEBRA

Infinitely many solutions? Let Desmos do it.

$$15x + 435 = a(x + 29)$$

In the given equation, a is a constant. If the equation has infinitely many solutions, what is the value of a?

Grid-in: you type the answer, there are no choices.

Try it first. *My working is on the next page.*

02

MY WORKING · 1 OF 2

Infinitely many solutions? Let Desmos do it.

THE KEY IDEA

Infinitely many solutions means both sides are the exact same thing, just written differently. Desmos can find the a that makes that happen.

1. Type the whole equation into Desmos in regression form. Change x to x_1, and change the equals sign to a tilde ($\sim$).

$$15x_1 + 435 \sim a(x_1 + 29)$$

2. Desmos needs some x_1 values to test. On the next line, give it ten random ones.

$$x_1 = \text{random}(10)$$

3. Desmos fits a straight away.

$$a = 15$$

4. Check by hand. $15 \times 29 = 435$, so the left side is just $15(x + 29)$. Both sides match, for every x.

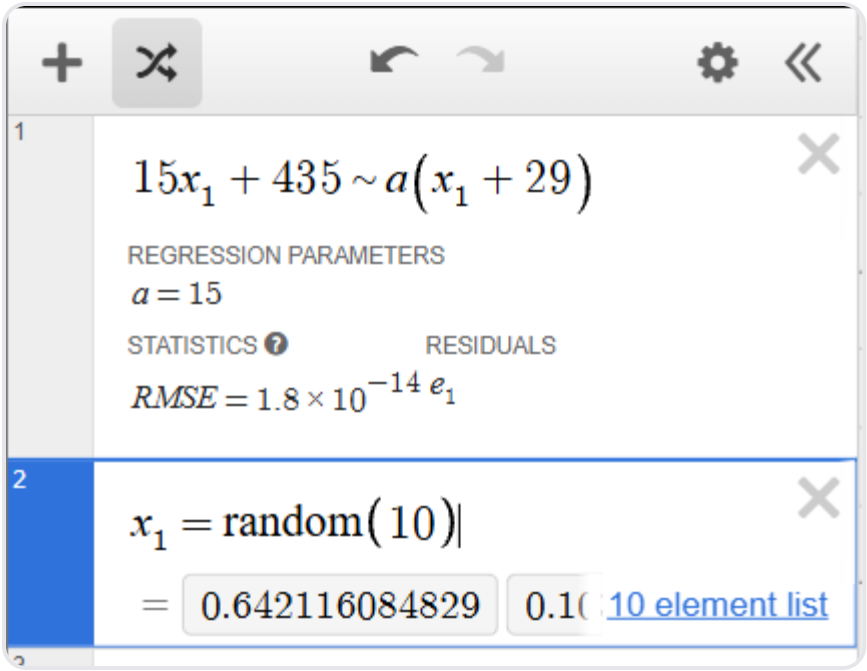
$$15x + 435 = 15(x + 29)$$

My working continues on the next page ↓

02

MY WORKING · 2 OF 2

Infinitely many solutions? Let Desmos do it.



FROM THE VIDEO The regression gives $a = 15$.

THE TRAP

Mixing up the two phrases. **No solution**: same x part, different number part. **Infinitely many**: everything matches.

ANSWER $a = 15$

03

PROBLEM SOLVING

A percent chain with a sneaky last step.

The mass of object A is 462% of the mass of object B, and the mass of object A is 0.084% of the mass of object C. If the mass of object C is p% of the mass of object B, what is the value of $\frac{p}{1{,}000}$?

Grid-in: you type the answer, there are no choices.

Try it first. *My working is on the next page.*

03

MY WORKING · 1 OF 2

A percent chain with a sneaky last step.

THE KEY IDEA

Turn the English into math. **"is"** means equals, and **"of"** means times.

1. One sentence, one equation.

$$A = 462\% \text{ of } B$$

$$A = 0.084\% \text{ of } C$$

$$C = p\% \text{ of } B$$

2. Three equations at once is a system, so put it in Desmos as a list. Left sides in one bracket, a tilde, then the right sides in the same order.

$$[A,\ A,\ C] \sim [462\% \text{ of } B,\ 0.084\% \text{ of } C,\ p\% \text{ of } B]$$

3. Desmos picks a size for B by itself. That's fine: p comes out the same whatever B is. If it gives you all zeros, add $B = 100$.

4. Now read the question again. It doesn't want p. It wants p over 1,000, so type exactly that on the next line.

$$\frac{p}{1000} = 550$$

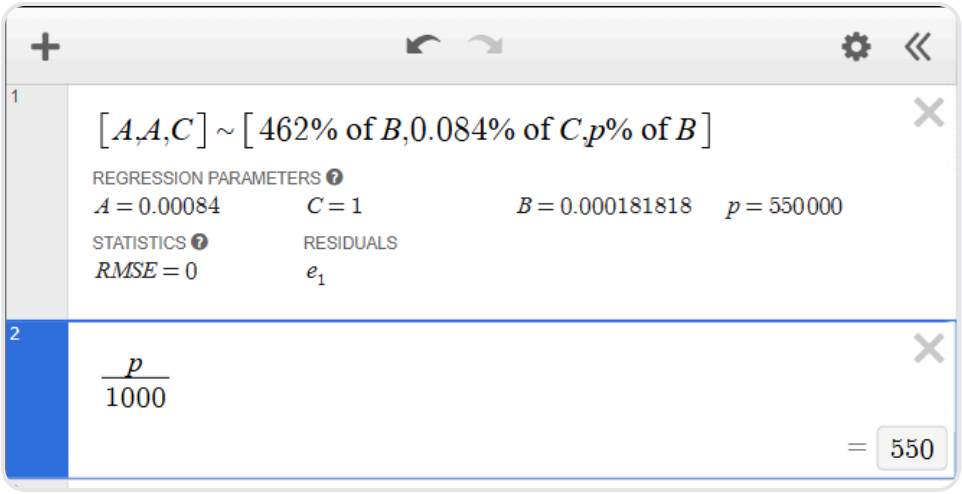
My working continues on the next page ↓

03

MY WORKING · 2 OF 2

A percent chain with a sneaky last step.

5 Check by hand. $C = \frac{4.62B}{0.00084} = 5{,}500B$, which is 550,000% of B. So $p = 550{,}000$ and $\frac{p}{1{,}000} = 550$.



FROM THE VIDEO The list regression, then $\frac{p}{1000}$ on its own line: 550.

THE TRAP

Typing **550,000**. That's p. The question asked for p divided by 1,000.

ANSWER **550**

04

GEOMETRY

Two tangents, one hypotenuse.

A circle has center G, and points M and N lie on the circle. Line segments MH and NH are tangent to the circle at points M and N, respectively. If the radius of the circle is 238 millimeters and the perimeter of quadrilateral $GMHN$ is 4,508 millimeters, what is the distance, in millimeters, between points G and H?

A) 238

B) 2,002

C) 2,016

D) 2,030

Try it first. *My working is on the next page.*

04

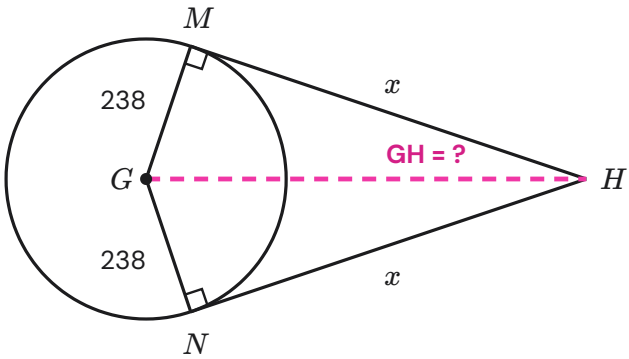
MY WORKING · 1 OF 2

Two tangents, one hypotenuse.

THE KEY IDEA

Two circle rules. **1.** A radius meets a tangent at a right angle. **2.** Two tangents from the same point are the same length.

1 Draw it. GM and GN are radii, so both are 238. The tangents meet at H.



2 Rule 2: MH and NH are equal. Call each one x. Add up all four sides.

$$238 + 238 + x + x = 4{,}508$$

$$2x = 4{,}032$$

$$x = 2{,}016$$

My working continues on the next page ↓

04

MY WORKING · 2 OF 2

Two tangents, one hypotenuse.

3 That's the tangent, not GH. Look again: rule 1 makes GMH a right triangle, and GH is its **hypotenuse**. The hypotenuse is always the longest side, so GH is bigger than 2,016. Only one choice is.

4 Check with Pythagoras.

$$GH = \sqrt{238^2 + 2016^2} = 2{,}030$$

THE TRAP

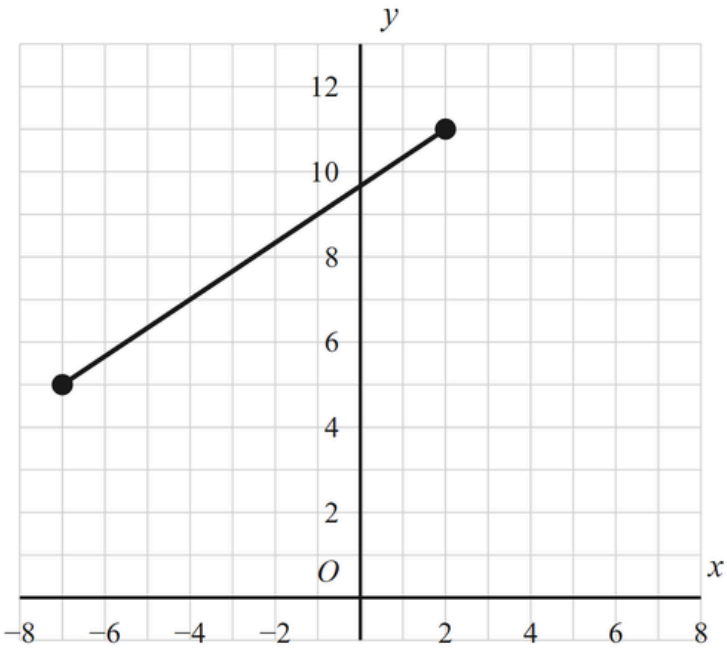
C, 2,016. It's the length of the tangent, and it's sitting right there in the choices waiting for you to stop one step early.

ANSWER **D. 2,030**

05

GEOMETRY

Find the other leg.



The line segment shown in the xy-plane represents one of the legs of a right triangle. The area of this triangle is $42\sqrt{13}$ square units. What is the length, in units, of the other leg of this triangle?

Grid-in: you type the answer, there are no choices.

Try it first. *My working is on the next page.*

05

MY WORKING · 1 OF 2

Find the other leg.

THE KEY IDEA

In a right triangle, the two legs are the **base and the height**. So area $= \frac{1}{2} \times \text{base} \times \text{height}$.

1. The segment goes from $(-7, 5)$ to $(2, 11)$. Find its length with Desmos's distance tool, and call it h.

$$h = \text{distance}\big((-7, 5),\ (2, 11)\big) = 10.8166\ldots$$

2. Now the area formula, with the other leg as b. Use a tilde instead of an equals sign, and Desmos solves for b.

$$\frac{1}{2} \cdot b \cdot h \sim 42\sqrt{13}$$

$$b = 28$$

3. Check by hand. The leg is $\sqrt{9^2 + 6^2} = \sqrt{117} = 3\sqrt{13}$.

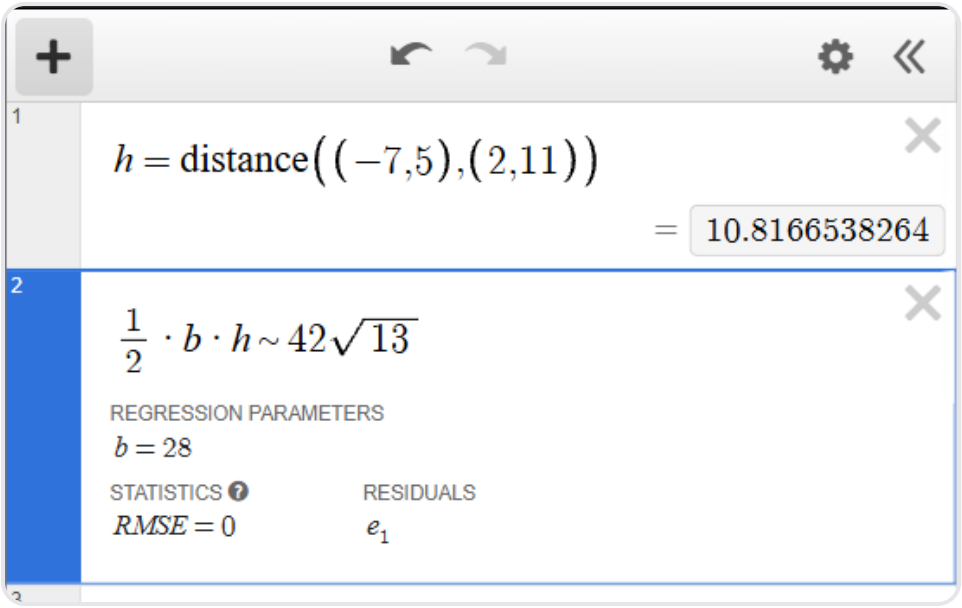
$$\frac{1}{2} \cdot 3\sqrt{13} \cdot L = 42\sqrt{13} \quad \Rightarrow \quad L = 28$$

My working continues on the next page ↓

05

MY WORKING · 2 OF 2

Find the other leg.



FROM THE VIDEO Distance first, then the area formula with a tilde: $b = 28$.

THE TRAP

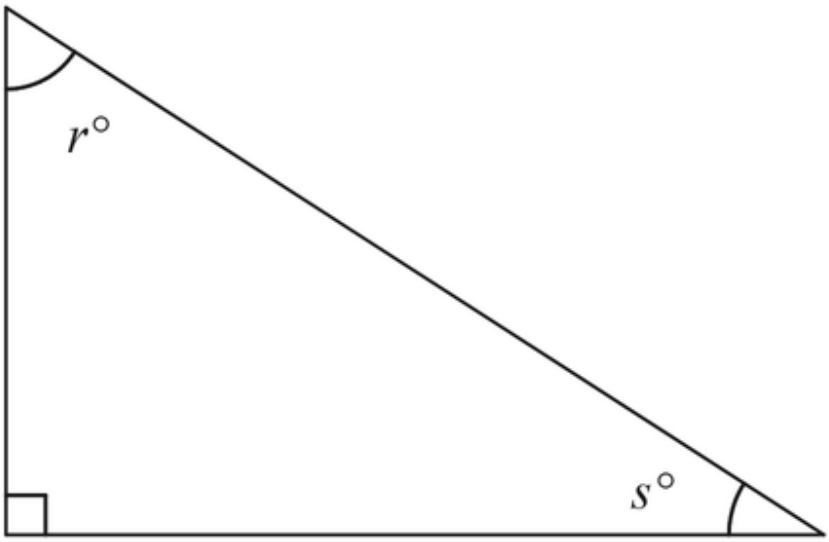
14. That's what you get when you forget the $\frac{1}{2}$ in the area formula.

ANSWER **28**

06

TRIGONOMETRY

Which one must be the greatest?



Note: Figure not drawn to scale.

In the figure, $3r > 19s$. Which of the following values must be the greatest?

(A) $\sin r°$

(B) $\cos r°$

(C) $\dfrac{\sin r°}{\sin s°}$

(D) $\dfrac{\sin r°}{\cos s°}$

Try it first. *My working is on the next page.*

06

MY WORKING · 1 OF 2

Which one must be the greatest?

THE KEY IDEA

In a right triangle the two small angles add up to 90. And when two angles add up to 90, **the sine of one equals the cosine of the other**.

1. So $r + s = 90$, which means $\sin r^\circ = \cos s^\circ$.

$$r + s = 90 \quad \Rightarrow \quad \sin r^\circ = \cos s^\circ$$

2. Choice D is the same number divided by itself, so D is exactly 1.

$$\frac{\sin r^\circ}{\cos s^\circ} = 1$$

3. Choices A and B: sine and cosine can never go above 1, whatever the angle. So A, B and D all top out at 1. That leaves C.

4. Double-check with real numbers. They must add up to 90 and fit the inequality. Try $r = 80$, $s = 10$: $3 \times 80 = 240$ is bigger than $19 \times 10 = 190$, so it works. Put Desmos in **degrees**, then:

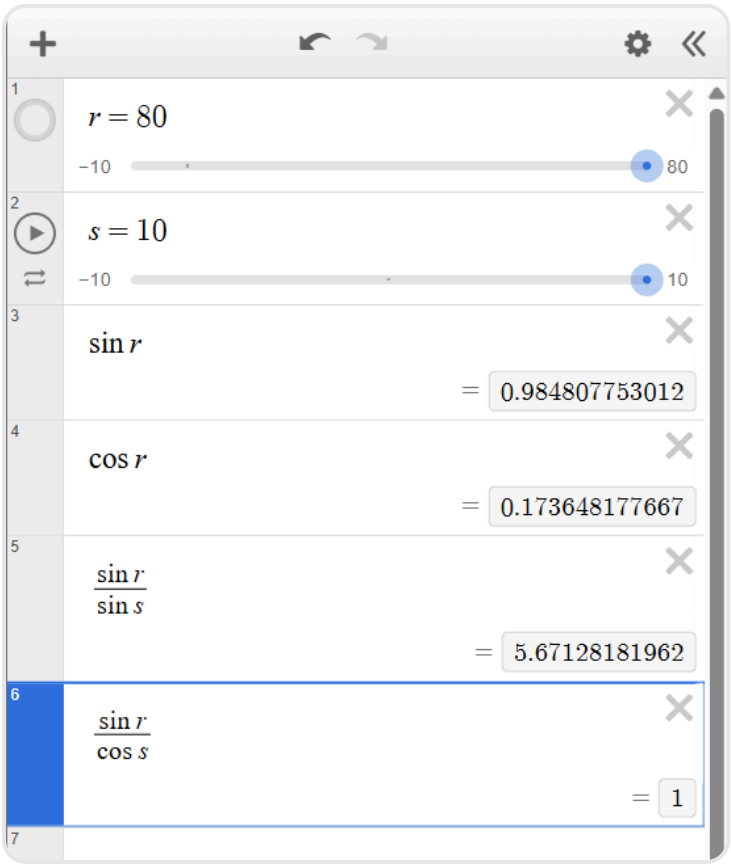
$$\frac{\sin 80^\circ}{\sin 10^\circ} \approx 5.67$$

My working continues on the next page ↓

06

MY WORKING · 2 OF 2

Which one must be the greatest?



FROM THE VIDEO $r = 80$, $s = 10$ in degree mode. A and B are under 1, C is about 5.67, and D is exactly 1.

THE TRAP

D looks big because of the fraction, but it's exactly 1. And if Desmos is in radians, every number you test is wrong.

ANSWER **C.** $\dfrac{\sin r^\circ}{\sin s^\circ}$

07

ADVANCED MATH

Don't expand it. Plug in x = 1.

The expression

$$-14(3x-4)^2+6(3x-2)^2$$

is rewritten as

$$\frac{a}{4}x^2+\frac{b}{4}x+\frac{c}{4},$$

where a, b, and c are constants. What is the value of $a+b+c$?

A -32

B -16

C -8

D -2

Try it first. *My working is on the next page.*

07

MY WORKING · 1 OF 2

Don't expand it. Plug in x = 1.

THE KEY IDEA

Both forms are the same expression, so they're equal for **every** x. Pick the x that hands you $a+b+c$ for free: $x=1$.

1. Why 1? Put $x=1$ into the rewritten form and you get exactly what we want.

$$\frac{a}{4}+\frac{b}{4}+\frac{c}{4}=\frac{a+b+c}{4}$$

2. First part, $x=1$:

$$-14(3-4)^2=-14(-1)^2=-14$$

3. Second part, $x=1$:

$$6(3-2)^2=6(1)^2=6$$

4. Add them: $-14+6=-8$. Set it equal to the rewritten form.

$$\frac{a+b+c}{4}=-8$$

5. We want $a+b+c$, not a quarter of it, so multiply both sides by 4.

$$a+b+c=-32$$

My working continues on the next page ↓

07

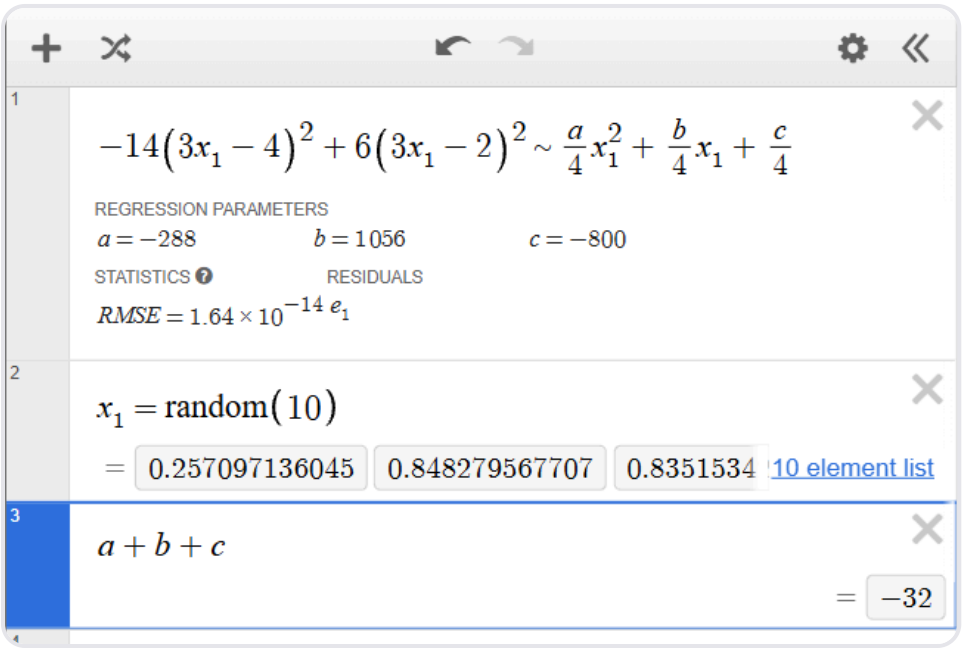
MY WORKING · 2 OF 2

Don't expand it. Plug in x = 1.

6 **Or let Desmos do it.** Type both forms as a regression: change x to x_1, put a tilde in the middle, and give x_1 ten random values. Desmos finds a, b and c, then just type $a+b+c$.

$$-14(3x_1-4)^2+6(3x_1-2)^2 \sim \frac{a}{4}x_1^2+\frac{b}{4}x_1+\frac{c}{4}$$

$$a+b+c=-288+1056-800=-32$$



FROM THE VIDEO The Desmos way: $a=-288$, $b=1056$, $c=-800$, so $a+b+c=-32$.

THE TRAP

C, -8. That's $\frac{a+b+c}{4}$. You forgot to multiply by 4.

ANSWER **A.** -32

08

GEOMETRY

Similar boxes: from area to volume.

Right rectangular prism X is similar to right rectangular prism Y. The surface area of right rectangular prism X is 52 square centimeters (cm^2), and the surface area of right rectangular prism Y is 832 cm^2. The volume of right rectangular prism X is 10.5 cubic centimeters (cm^3). What is the volume, in cm^3, of right rectangular prism Y?

Grid-in: you type the answer, there are no choices.

Try it first. *My working is on the next page.*

08

MY WORKING · 1 OF 2

Similar boxes: from area to volume.

THE KEY IDEA

Similar means same shape, different size. If the sides get k times longer, the **area** gets k^2 times bigger and the **volume** gets k^3 times bigger.

1 Surface area is an area. Divide to see how many times bigger Y's is. That number is k^2.

$$\frac{832}{52} = 16 = k^2$$

2 So $k = 4$. Every side of Y is 4 times longer than X's.

$$k = \sqrt{16} = 4$$

LENGTH× 4k

→

AREA× 16k²

→

VOLUME× 64k³

3 Volume grows by k^3.

$$4^3 = 64$$

My working continues on the next page ↓

08

MY WORKING · 2 OF 2

Similar boxes: from area to volume.

4 Multiply X's volume by 64.

$$10.5 \times 64 = 672$$

THE TRAP

168. That's 10.5×16: using the area number on a volume. Area goes up by k^2, volume by k^3.

ANSWER **672**

09

ADVANCED MATH

The sum of the solutions.

$$18(w-a)(w+5)=6(w+5)$$

In the given equation, a is a constant. The sum of the solutions to the equation is $\frac{37}{3}$. What is the value of a?

Grid-in: you type the answer, there are no choices.

Try it first. *My working is on the next page.*

09

MY WORKING · 1 OF 2

The sum of the solutions.

THE KEY IDEA

A solution is a number that makes the equation true. Call the two solutions b and c, and tell Desmos everything you know about them.

1. Move everything to the left so the right side is 0. Call the left side $f(w)$.

$$f(w) = 18(w - a)(w + 5) - 6(w + 5)$$

2. b and c are solutions, so $f(b) = 0$ and $f(c) = 0$. They add up to $\frac{37}{3}$. That's three equations, so use a list.

$$[f(b),\ f(c),\ b + c] \sim \left[0,\ 0,\ \tfrac{37}{3}\right]$$

3. Desmos may give b and c the same value, one solution counted twice. They're two different solutions, so add a rule that says so.

$$[f(b),\ f(c),\ b + c] \sim \left[0,\ 0,\ \tfrac{37}{3}\right]\ \{c > b\}$$

4. Now Desmos gives $b = -5$, $c = 17.333\ldots$ and the answer.

$$a = 17$$

My working continues on the next page ↓

09

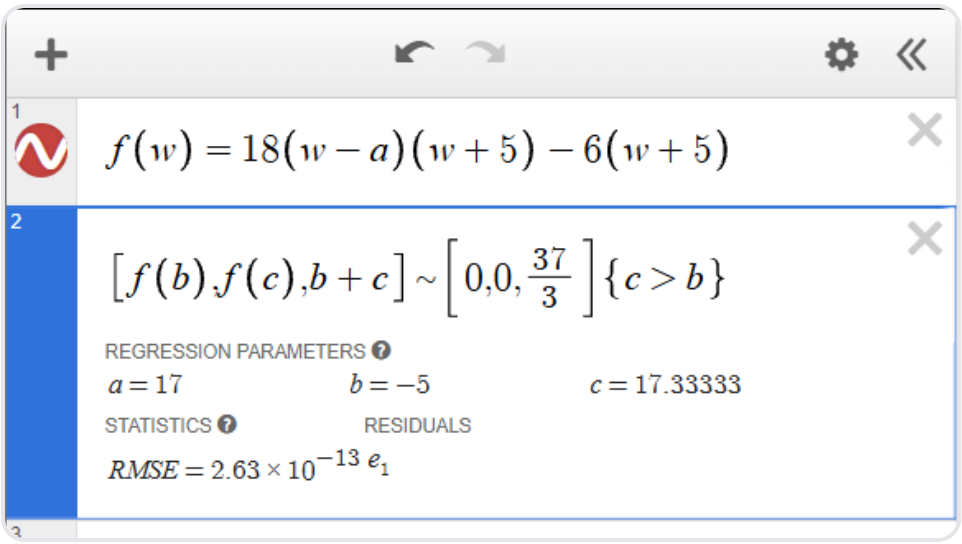
MY WORKING · 2 OF 2

The sum of the solutions.

5 Check by hand. Pull out $(w+5)$: the solutions are -5 and $a+\frac{1}{3}$.

$$(w+5)\big(18(w-a)-6\big)=0$$

$$-5+a+\tfrac{1}{3}=\tfrac{37}{3} \quad\Rightarrow\quad a=17$$



FROM THE VIDEO With $\{c>b\}$ added: $b=-5$, $c=17.333$, $a=17$.

THE TRAP

12. Dividing both sides by $(w+5)$ throws away the solution $w=-5$, and the sum comes out wrong.

ANSWER **17**

10

ADVANCED MATH

"Must be true"? Try to break it.

$$h(x) = a(x + 39)(x + r)(x + s)$$

The polynomial function h is defined by the given equation, where a, r, and s are positive constants. In the xy-plane, the graph of $y = h(x)$ intersects the x-axis at exactly three points. If $h(0) = p$, which of the following must be true?

A $p < 39rs$

B $p = 39rs$

C $p > 39rs$

D There is not enough information to compare the values of p and $39rs$.

Try it first. *My working is on the next page.*

10

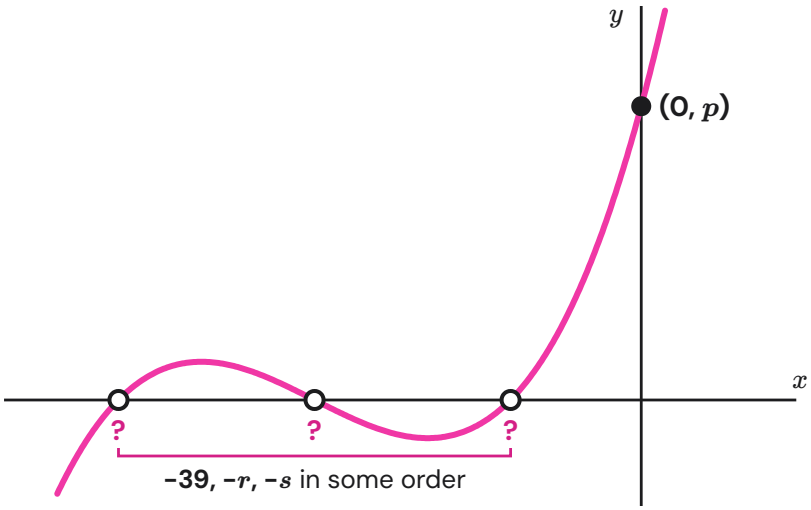
MY WORKING · 1 OF 4

"Must be true"? Try to break it.

THE KEY IDEA

Must be true means true 100% of the time. Find just one case where a choice is false, and it's out.

1 Sketch it. a is positive, so this cubic starts low on the left and ends high on the right. It crosses the x-axis at -39, $-r$ and $-s$. We don't know r and s, so we don't know the order. We only know all three are on the left.



2 $h(0)$ means $x = 0$, which is the y-intercept. So p is where the graph crosses the y-axis. Plug in 0:

$$p = a(0+39)(0+r)(0+s) = a \cdot 39rs$$

My working continues on the next page ↓

10

MY WORKING · 2 OF 4

"Must be true"? Try to break it.

3 So p is $39rs$ with an extra a in front. The question never tells us how big a is, only that it's positive. That's the whole question.

4 Test it in Desmos. Type $h(x)$ with sliders, then $h(0)$ and $39rs$ on their own lines. Pick any r and s. Changing them moves both numbers together, so the slider that matters is a.

5 $a = 2$: p is bigger than $39rs$. A and B are false. $a = 0.5$: p is smaller. C is false.

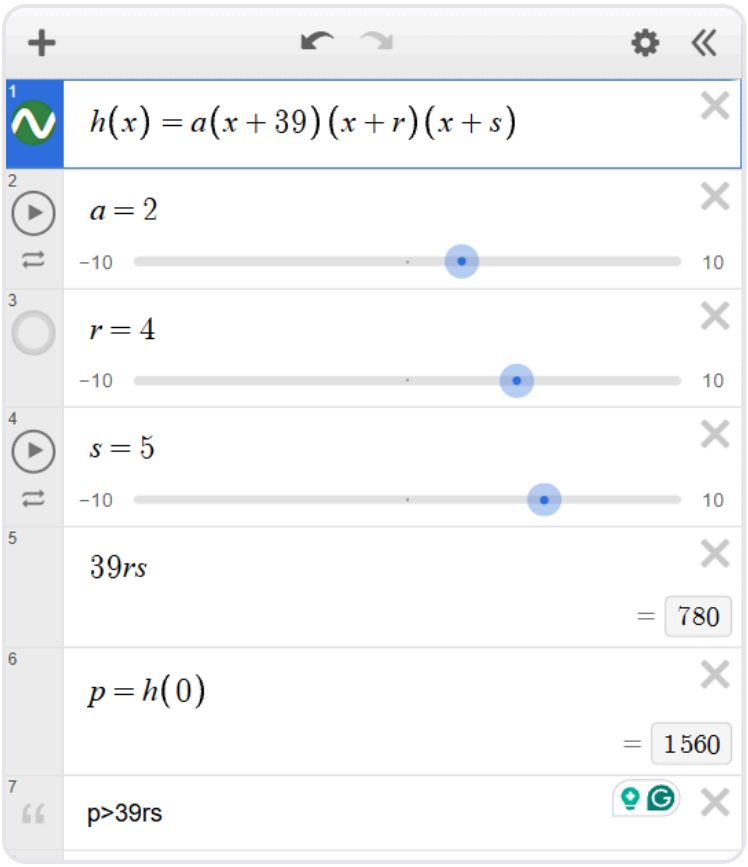
6 Every one of A, B and C breaks for some a. Nothing must be true, so the answer is D.

My working continues on the next page ↓

10

MY WORKING · 3 OF 4

"Must be true"? Try to break it.



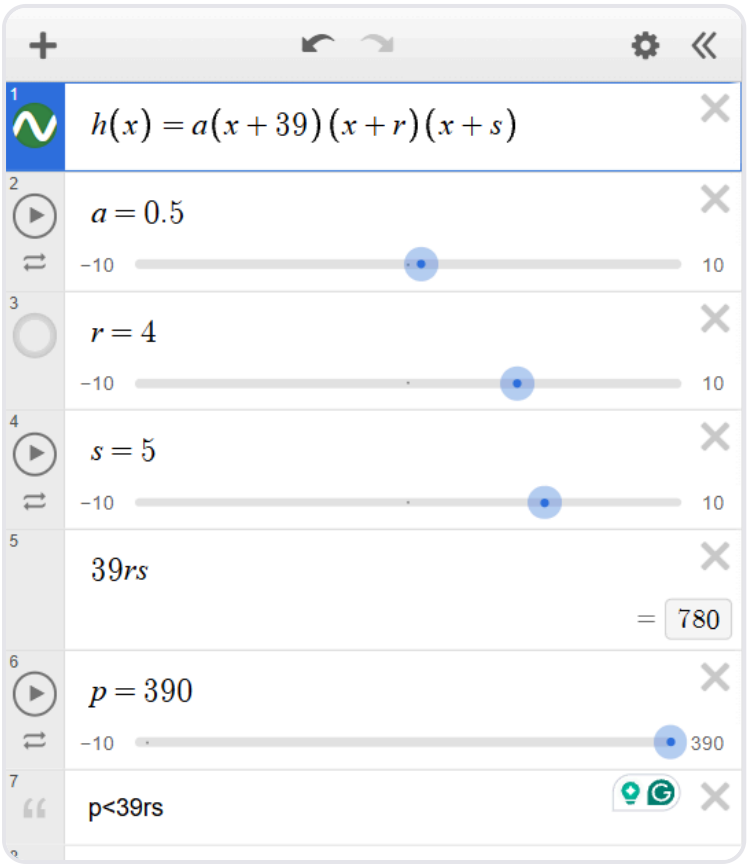
FROM THE VIDEO $a = 2$: $p = 1560$, bigger than $39rs = 780$. A and B are out.

My working continues on the next page ↓

10

MY WORKING · 4 OF 4

"Must be true"? Try to break it.



FROM THE VIDEO $a = 0.5$: $p = 390$, smaller than $39rs = 780$. C is out.

THE TRAP

B. If you forget the a, or only test with $a = 1$, p always equals $39rs$ and B looks right.

ANSWER **D. Not enough information**

ANSWER KEY

01	No solution? Match the slopes.	$t = 1$
02	Infinitely many solutions? Let Desmos do it.	$a = 15$
03	A percent chain with a sneaky last step.	**550**
04	Two tangents, one hypotenuse.	**D. 2,030**
05	Find the other leg.	**28**
06	Which one must be the greatest?	**C.** $\frac{\sin r^\circ}{\sin s^\circ}$
07	Don't expand it. Plug in x = 1.	**A.** -32
08	Similar boxes: from area to volume.	**672**
09	The sum of the solutions.	**17**
10	"Must be true"? Try to break it.	**D. Not enough information**

THE 750 GUARANTEE

750 in SAT Math, or I teach you free until you get there.

1-on-1 with a tutor who scored 800, even if math has always been hard. Not everyone qualifies. Your free 25-minute diagnosis shows if you do.

See if you qualify →

satmathwithtan.com