Released Items

Worked out answer key ↓

Student Name: _____

NC Math 2

RELEASED

2017–2018

NC Final Exam

Public Schools of North Carolina
State Board of Education
Department of Public Instruction
Raleigh, North Carolina 27699-6314

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1 Which expression is equivalent to $(8w^7x^{-5}y^3z^{-9})^{-\frac{2}{3}}$?

A $\frac{x^{\frac{10}{3}}z^6}{4w^{\frac{14}{3}}y^2}$

B $\frac{4w^{\frac{14}{3}}y^2}{x^{\frac{10}{3}}z^6}$

C $\frac{2w^{\frac{5}{3}}y^{\frac{1}{3}}}{x^{\frac{7}{3}}z^{\frac{11}{3}}}$

D $\frac{x^{\frac{7}{3}}z^{\frac{11}{3}}}{2w^{\frac{5}{3}}y^{\frac{1}{3}}}$

$8^{-\frac{2}{3}} w^{-\frac{14}{3}} x^{\frac{10}{3}} y^{-\frac{6}{3}} z^{\frac{18}{3}}$

$\frac{x^{\frac{10}{3}}z^6}{8^{\frac{2}{3}} w^{\frac{14}{3}} y^2}$

$8^{\frac{2}{3}} = \sqrt[3]{8^2} = \sqrt[3]{64} = 4$

$\frac{x^{\frac{10}{3}}z^6}{4w^{\frac{14}{3}}y^2}$

2 A marathon is roughly 26.2 miles long. Which equation could be used to determine the time, t, it takes to run a marathon as a function of the average speed, s, of the runner where t is in hours and s is in miles per hour?

A $t = 26.2 - 26.2s$

B $t = 26.2 - \frac{s}{26.2}$

C $t = 26.2s$

D $t = \frac{26.2}{s}$

time it takes to run the marathon = $\frac{26.2}{\text{speed}}$

$\text{time} = \frac{\text{distance}}{\text{speed}}$

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3 The force, F, acting on a charged object varies inversely to the square of its distance, r, from another charged object. When the two objects are 0.64 meter apart, the force acting on them is 8.2 Newtons. ***Approximately*** how much force would the object feel if it is at a distance of 0.77 meter from the other object?

A 1.7 Newtons

B 5.7 Newtons

C 11.9 Newtons

D 12.9 Newtons

$F = \frac{K}{r^2}$

$8.2 = \frac{K}{(.64)^2}$

$8.2 = \frac{K}{.4096}$

$K = 3.36$

$F = \frac{3.36}{.77^2}$

$F = 5.7$

4 A system of equations is shown below.

$$y = x^2 + 2x + 8$$

$$y = -4x$$

What is the smallest value of y in the solution set of the system?

A -4

B -2

C 8

D 16

$x^2 + 2x + 8 = -4x$

$x^2 + 6x + 8 = 0$

$(x+4)(x+2) = 0$

$x = -4$ $x = -2$

$y = 16$ $y = 8$

smallest y-value

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5 The cost of a newspaper advertisement is a function of its size.

- A company wants its advertisement to have a height that is twice its width. $h = 2w$
- The newspaper charges a flat rate of \$50 plus an additional \$10 per square inch. $50 + 10s = C$
- The company can spend no more than \$2,050 on the advertisement. $\leq 2{,}050$

What is the maximum height of an advertisement that the company can afford?

7.5
5 | 37.200

- X A 5 inches
- X B 10 inches
- X C 15 inches
- ✓ D 20 inches

$50 + 10s \leq 2050$

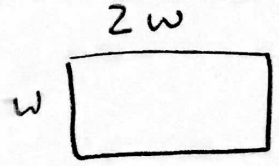
$10s \leq 2000$

$s \leq 200$

sq in for ad

$h = 2w$

$h = 2w$



10

20 | 20 x 10 = 200

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Farmer Brown built a rectangular pen for his chickens using 12 meters of fence.

- He used part of one side of his barn as one length of the rectangular pen.
- He maximized the area using the 12 meters of fence.

Farmer Johnson built a rectangular pen for her chickens using 16 meters of fence.

- She used part of one side of her barn as one length of the rectangular pen.
- The length of her pen was 2 meters more than the length of Farmer Brown's pen.
- The width of her pen was 1 meter more than the width of Farmer Brown's pen.

How much larger is Farmer Johnson's rectangular pen than Farmer Brown's?

A 24 square meters

B 18 square meters

C 16 square meters

D 14 square meters

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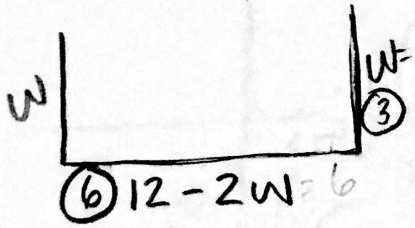
$w+w+\ell=12 \rightarrow 2w+\ell=12$

$w+1+w+1+\ell+2=16$

$2w+4+\ell=16$

$\begin{cases} 2w+\ell=12 \\ 2w+\ell=12 \end{cases}$

Brown

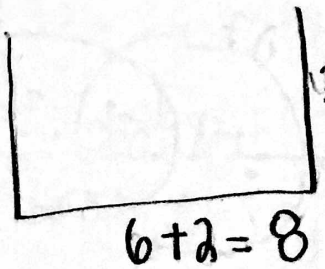


$A=(w)(12-2w)$

$A=12w-2w^2$

max in Calc: 3

Johnson



Johnson's area: $32-18=14$

Brown's area

sa
m

7 Suppose that Jamal can choose to get home from work by taxi or bus.

- When he chooses to get home by taxi, he arrives home after 7 p.m. 8 percent of the time.
- When he chooses to get home by bus he arrives home after 7 p.m. 15 percent of the time.
- Because the bus is cheaper, he uses the bus 60 percent of the time.

What is the ***approximate*** probability that Jamal chose to get home from work by bus, given that he arrived home after 7 p.m.?

A 0.09

B 0.14

C 0.60

D 0.74

	After 7	Before 7	Total
Bus	.09	.51	.6
Taxi	.032	.368	.4
Total	.122	.878	1

$\frac{.09}{.122} = .74$

8 The graph of $f(x) = 2x^2 - 3x + 5$ will be translated 8 units down, producing the graph of $q(x)$. Which equation represents the new function, $q(x)$?

A $q(x) = 2x^2 - 3x - 3$

B $q(x) = 2x^2 - 11x + 5$

C $q(x) = 2x^2 - 3x + 13$

D $q(x) = 2x^2 + 5x + 5$

$f(x) = 2x^2 - 3x + 5$

vertex: $\left(\frac{3}{4}, \frac{31}{8}\right)$

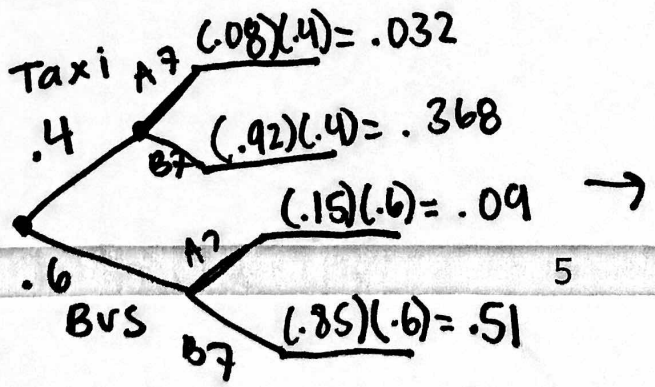
$y = 2\left(x - \frac{3}{4}\right)^2 + \frac{31}{8}$

Down 8:

$y = 2\left(x - \frac{3}{4}\right)^2 - \frac{33}{8}$

$y = 2x^2 - 3x - 3$

$+5 - 8 = -3$



or

Create 2 way table

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9 The equation $2x^2 - 5x = -12$ is rewritten in the form of $2(x - p)^2 + q = 0$. What is the value of q?

$2(x^2 - \frac{5}{2}x + \frac{25}{16}) = -12 + \frac{25}{8}$

$\left(\frac{-\frac{5}{2}}{2}\right)^2 = \frac{25}{16}$

$2(x - \frac{5}{4})^2 = -\frac{71}{8}$

$2(x - \frac{5}{4})^2 + \frac{71}{8} = 0$

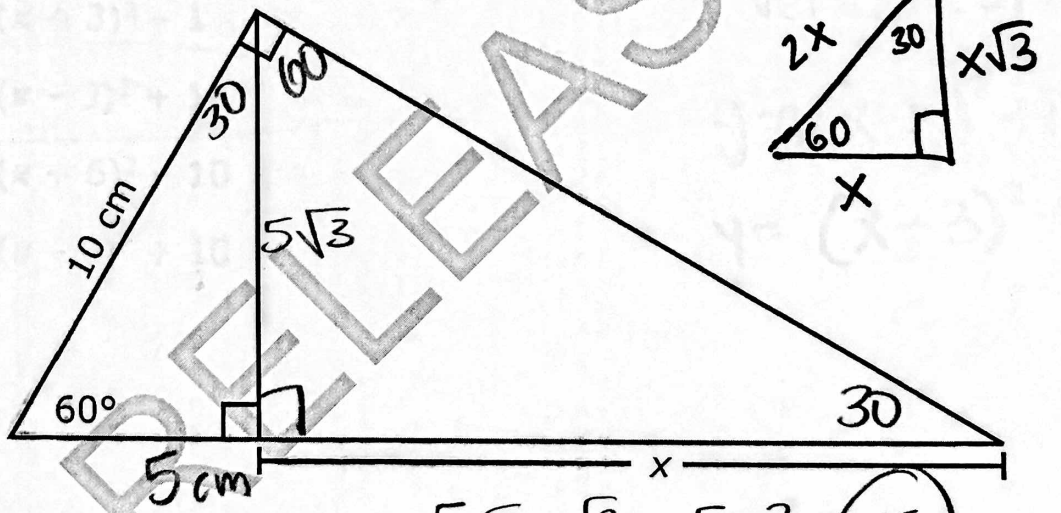
A $\frac{167}{16}$

B $\frac{71}{8}$

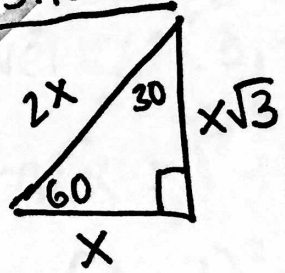
C $\frac{25}{8}$

D $\frac{25}{16}$

10 What is the value of x in the triangle below?



Shortcut:



$5\sqrt{3} \cdot \sqrt{3} = 5 \cdot 3 = 15$ cm

A $\frac{5\sqrt{3}}{2}$ cm

B $5\sqrt{3}$ cm

C 10 cm

D 15 cm

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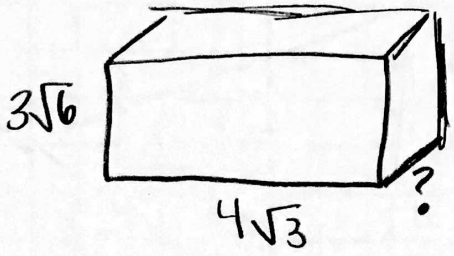
11 The length of a rectangular prism is $4\sqrt{3}$ units. The height is $3\sqrt{6}$ units. If the volume is irrational, which could be the measure of the width of the rectangular prism?

A $2\sqrt{50}$

B $4\sqrt{12}$ ✓

C $5\sqrt{8}$

D $7\sqrt{18}$



$V = lwh$

$V = (4\sqrt{3})(w)(3\sqrt{6})$

$V = 12\sqrt{18}\,w$

$V = 12\sqrt{9 \cdot 2}\,w$

$V = 36\sqrt{2}\,w$

12 Which function is equivalent to $y = x^2 - 6x + 10$?

A $y = (x + 3)^2 - 1$

B $y = (x - 3)^2 + 1$

C $y = (x + 6)^2 - 10$

D $y = (x - 6)^2 + 10$

vertex: $(3, 1)$ (h, k)

$y = a(x - h)^2 + k$

$y = (x - 3)^2 + 1$

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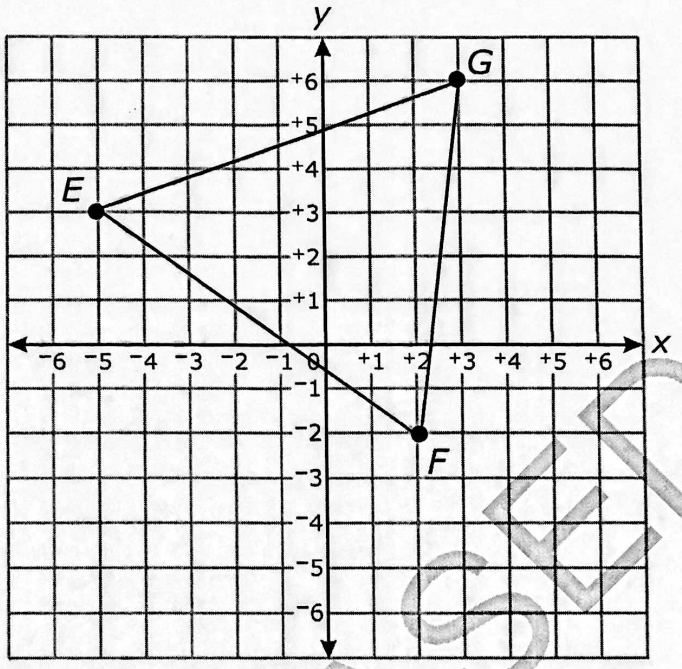
13 Triangle *EGF* is graphed below.



Triangle *EGF* will be rotated 90° counterclockwise around the origin and will then be reflected across the *y*-axis, producing an image triangle. Which additional transformation will map the image triangle back onto the original triangle?

A rotation 270° counterclockwise around the origin

B rotation 180° counterclockwise around the origin

C reflection across the line $y = -x$

D reflection across the line $y = x$

90°: $(x,y) \rightarrow (-y,x)$

y-axis reflection: $(x,y) \rightarrow (-x,y)$

combination: $(x,y) \rightarrow (y,x)$

same as $y=x$ reflection!

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