A Message from the Authors:

Thank you for downloading our free product! These problem pages with their corresponding solutions will provide you with a sample of the products available for digital download on Teachers Pay Teachers (9 sets available + Bundles!). Our multiple choice warm-ups were designed to be used on a daily basis to reinforce fundamental math concepts and to prepare students for standardized tests. These practice exercises can be used to stretch students in PreAlgebra, review basic math skills for students in Algebra, or to reteach essential math skills for students in any high school math course.

Key features of each problem set include:

- **Multiple choice format** based on the design of numerous standardized tests
- Topics addressed in a random order similar to most standardized tests
- Specific problem page designed to be completed without a calculator
- Three levels of difficulty on each page (easy, moderate and hard but not in the same order on each page) and difficulty level increases as students progress through all 9 sets or all 90 pages of the complete resource
- **Detailed step-by-step solutions** for every question (written specifically for students to develop or reinforce their understanding of basic mathematical and algebraic processes and to expose and correct students' errors)
- Common Core State Standards for Mathematics listed for each problem
- Most appropriate Mathematical Practice from the Common Core Standards noted for each problem (although more than one practice often applies)
- These sets are also available as Google Forms products.

The complete resource, *Gaining Math Momentum: Building Basic Skills* (270 exercises + detailed solutions), is also available on CD-ROM (pdf files) or as a spiral bound book on our website. This book (or CD) includes the following additional features:

- Course content index (topics typically covered in high school math courses)
- Extra tutorial sections for student reference on math terminology and notation as well as fractions, decimals, percents and operations with integers (these instructional resources are also available as digital downloads on Teachers Pay Teachers)
- Quick reference answer key
- Formula Reference Sheets of basic mathematical formulas

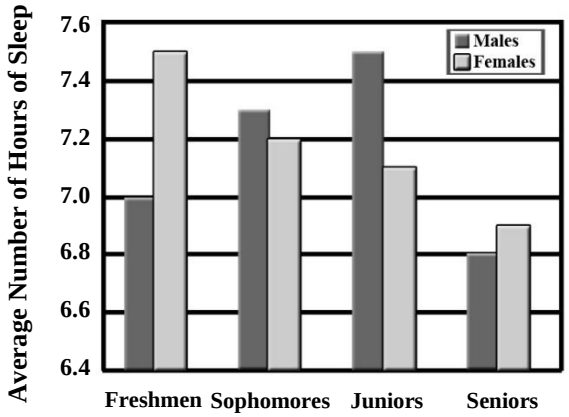
We encourage you to use these math warm-ups to engage your students at the bell, revisit critical math skills and teach test-taking strategies! We feel that continual daily review of these concepts during the school year will allow students to build confidence and competence in their basic understanding of mathematics, gaining the momentum necessary to succeed in your math classroom! Enrich your curriculum with this supplement!

We would love to have your feedback on this product so that we may better serve you! Follow us on TPT and on Facebook or visit our website: mathmomentum.com!!

Rachel Gelderman & Susan West

Common Core Standard: 2.MD.10, 5.NBT.7
Mathematical Practice: *Attend to precision.*

1. Because Clark, a junior at Metropolis High, sleeps in math class, students were asked to develop a survey to determine the average number of hours high school students sleep on a daily basis. The survey results are shown in the histogram to the right. How many more hours does the average junior boy sleep than the average junior girl?



A 7.5 hours

B 7.1 hours

C 4.0 hours

D 0.4 hours

Common Core Standard: 7.EE.4.b, A-REI.3
Mathematical Practice: *Reason abstractly and quantitatively.*

2. Solve the inequality: $4x + 6 < 12$

A $x < 6$

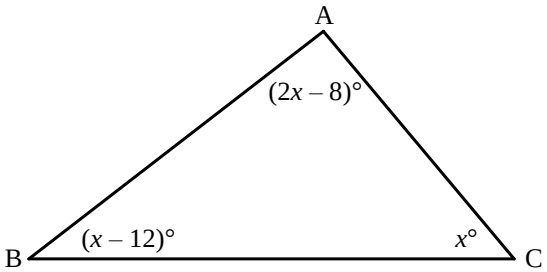
B $x > \frac{2}{3}$

C $x < \frac{3}{2}$

D No solution

Common Core Standard: 7.G.5, 8.EE.7, A-REI.3
Mathematical Practice: *Make sense of problems and persevere in solving them.*

3. Find the measure of $\angle B$.



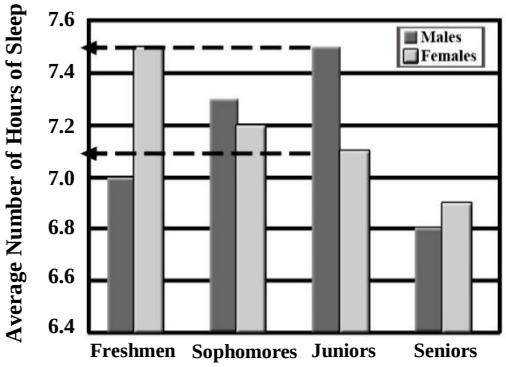
A 28°

B 38°

C 40°

D 50°

1. **(D)** According to the histogram, junior boys sleep an average of 7.5 hours on a daily basis and junior girls sleep an average of 7.1 hours. To find how many more hours the average junior boy sleeps than the average junior girl, find the difference between these two numbers.



$$7.5 - 7.1 = 0.4 \text{ hours}$$

2. **(C)** Solve as follows:

$$4x + 6 < 12$$

Subtract 6 from both sides: $4x < 6$

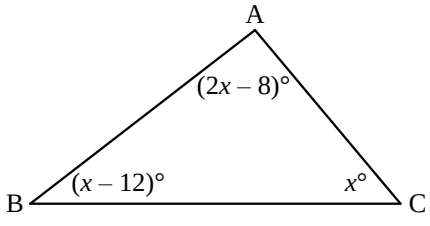
Divide both sides by 4: $x < \frac{6}{4}$

Simplify: $x < \frac{3}{2}$

Note: The inequality sign is reversed only when multiplying or dividing by a negative number.

3. **(B)** To find the measure of $\angle B$ ($m\angle B$), recall that the sum of the measures of the angles of a triangle is 180° which produces the equation:

$$m\angle A + m\angle B + m\angle C = 180°$$



Substitute: $2x - 8 + x - 12 + x = 180$

Combine like terms: $4x - 20 = 180$

Add 20 to both sides: $4x = 200$

Divide both sides by 4: $x = 50$

Substitute 50 for x in the expression for the measure of $\angle B$ ($m\angle B$):

$$m\angle B = x - 12 = 50 - 12 = 38$$

Therefore $\angle B$ measures 38°.

Solutions to Page 8

Common Core Standard: 5.NF.1
Mathematical Practice: *Attend to precision.*

1. Simplify: $4\frac{1}{5} - 1\frac{3}{7}$

   A $3\frac{2}{12}$

   B $3\frac{2}{35}$

   C $2\frac{27}{35}$

   D 2

Common Core Standard: 8.SP.2
Mathematical Practice: *Look for and make use of structure.*

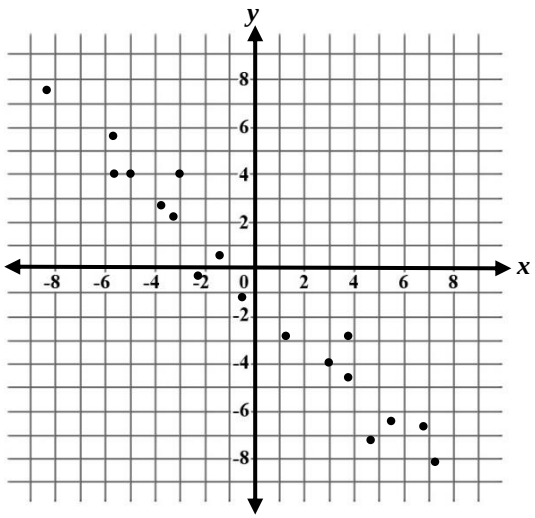
2. Given the scatter plot, find the line of best fit.

   A $y = -x - 1$

   B $y = x - 1$

   C $y = -3x + 1$

   D $y = 3x + 1$



Common Core Standard: 6.RP.3.d
Mathematical Practice: *Reason abstractly and quantitatively.*

3. How many square inches are in one square foot?

   A 12 square inches

   B 24 square inches

   C 48 square inches

   D 144 square inches

1. **(C)** Begin by changing both mixed numbers to improper fractions. Then subtract by finding a common denominator. In this case, the lowest common denominator is 35. Simplify as follows:

$$4\tfrac{1}{5} - 1\tfrac{3}{7}$$

Change to improper fractions: $= \frac{21}{5} - \frac{10}{7}$

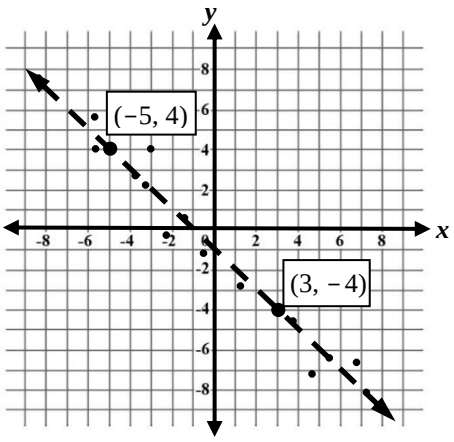
Produce fractions equivalent to $\frac{21}{5}$ and $\frac{10}{7}$ with a common denominator of 35: $= \frac{21}{5} \bullet \frac{7}{7} - \frac{10}{7} \bullet \frac{5}{5} = \frac{147}{35} - \frac{50}{35}$

Combine the numerators: $= \frac{97}{35}$

Because this improper fraction is not among the answer choices, convert it to a mixed number: $\frac{97}{35} = 2\frac{27}{35}$.

2. **(A)** The line of best fit is a line that "fits" the data "best." It is a line that most closely approximates the relationship between the two variables. Begin by sketching a line that fits the data "best" (see dotted line). One method to find the equation of this line ($y = mx + b$) is to approximate the slope (m) and the y-intercept (b). From the graph, the y-intercept (where the line crosses the y-axis) is approximately -1. The slope is negative because one variable decreases as the other variable increases. This alone would be enough to determine that the answer must be $y = -x - 1$.

To find the approximate slope, choose two points that could be on the line of best fit. For example, the points $(-5, 4)$ and $(3, -4)$ were chosen here to approximate the slope. Substitute these coordinates into the slope formula with $(-5, 4)$ as (x_1, y_1) and $(3, -4)$ as (x_2, y_2).



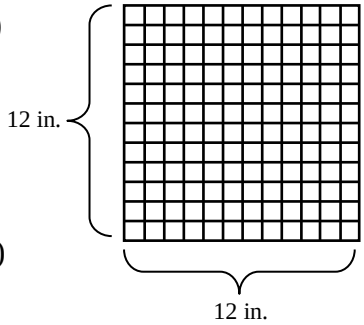
Slope Formula: $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

Substitute coordinates: $m = \dfrac{-4-4}{3-(-5)}$

Simplify: $m = \dfrac{-8}{8} = -1$

Since $m = -1$ and $b = -1$, the line of best fit is $y = -1x + (-1)$ or $y = -x - 1$.

3. **(D)** Draw a diagram of a square that measures 1 foot (12 inches) on each side. To find the area of the square (which is also a rectangle), use the area formula given on the Formula Sheet: $A = lw$. In this case, the length (l) and width (w) are both 12 inches.



$A = lw$

Substitute values: $A = (12 \text{ inches})(12 \text{ inches})$

Simplify: $A = 144$ square inches

Note that there are 144 squares (each representing one square inch) in the diagram.

Solutions to Page 33

Common Core Standard: 5.NBT.4
Mathematical Practice: *Attend to precision.*

1. Round 5481.06749 to the nearest thousandth.

   A 5481.067

   B 5481.0674

   C 5481.0675

   D 5481.068

Common Core Standard: 7.G.6
Mathematical Practice: *Make sense of problems and persevere in solving them.*

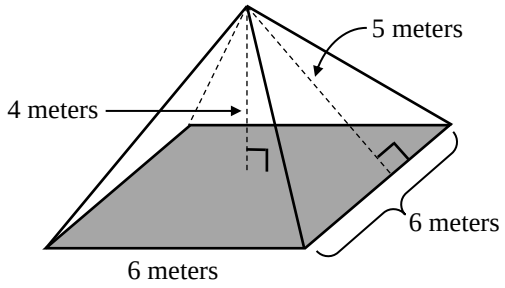
2. Find the surface area of the pyramid.

   A 48 m^2

   B 60 m^2

   C 84 m^2

   D 96 m^2



Common Core Standard: 6.EE.2.c
Mathematical Practice: *Attend to precision.*

3. Evaluate when $x = -2$: $-5x^3 + 6x^2 - 3x$

   A −22

   B 10

   C 12

   D 70

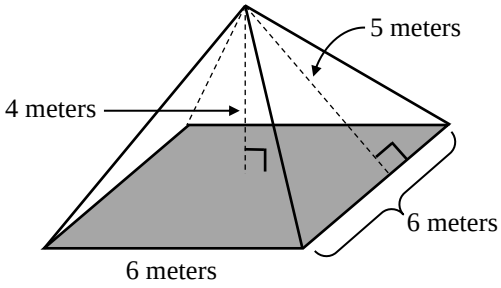
1. **(A)** Recall place value:

5	4	8	1	.	0	6	**7**	(4)	9
Thousands	Hundreds	Tens	Ones		Tenths	Hundredths	**Thousandths**	Ten Thousandths	Hundred Thousandths

The digit in the thousandths place in the number 5481.06749 is 7. To round, use the digit to the right of 7 (in this case, the ten thousandths place). If this digit had been at least 5, then 7 would round to 8. But this digit is less than 5 (the digit is 4), so 7 remains. 5481.06749 rounded to the nearest thousandth is 5481.067.

2. **(D)** Surface area is the sum of the areas of the surfaces which make up the pyramid: the square base and the four triangular faces which are congruent and therefore have the same area. The formula provided on the Formula Sheet for the surface area of a pyramid with a square base is:

$$SA = s^2 + 4\left(\tfrac{1}{2} s \ell\right) = s^2 + 2s\ell$$



The area of the square base is s^2 and the area of the 4 triangles is $4\left(\tfrac{1}{2} s \ell\right)$ where s is the length of the side of the square and ℓ is the slant height or height of the triangular face. Recall that the height of a triangle is perpendicular to its base. In this example, the length s of the side of the square is 6 meters and the slant height ℓ is 5 meters.

$SA = s^2 + 4\left(\tfrac{1}{2} s \ell\right)$

Simplify: $SA = s^2 + 2s\ell$

Substitute (s = 6 m, ℓ = 5 m): $SA = (6\text{ m})^2 + 2(6\text{ m})(5\text{ m})$

Simplify: $SA = 36\text{ m}^2 + 60\text{ m}^2$

$SA = 96\text{ m}^2$

3. **(D)** Substitute the given value for x into the expression and simplify using the order of operations. Remember to use parentheses when substituting a negative value.

$-5x^3 + 6x^2 - 3x$

Substitute ($x = -2$): $-5(-2)^3 + 6(-2)^2 - 3(-2) =$

Exponents: $-5(-8) + 6(-2)^2 - 3(-2) =$ $\left[(-2)^3 = (-2)(-2)(-2) = -8\right]$

$-5(-8) + 6(4) - 3(-2) =$ $\left[(-2)^2 = (-2)(-2) = 4\right]$

Multiply $-5(-8)$ and $6(4)$: $40 + 24 - 3(-2) =$ [The sign refers to the term that it precedes.]

Multiply $-3(-2)$: $40 + 24 + 6 =$

Add: 70

Solutions to Page 45

NO CALCULATOR

Recommendation: Students should not use a calculator to solve the problems on this page.

Common Core Standard: 6.NS.7, 8.NS.1, 8.NS.2, 8.EE.3
Mathematical Practice: *Reason abstractly and quantitatively.*

1. Put the following numbers in order from least to greatest:

$$2.\overline{13},\ \sqrt{3},\ \frac{-13}{5},\ 1.69 \times 10^{-3},\ 6\%$$

A $\frac{-13}{5}$, $2.\overline{13}$, $\sqrt{3}$, 6%, 1.69×10^{-3}

B $\frac{-13}{5}$, 1.69×10^{-3}, 6%, $\sqrt{3}$, $2.\overline{13}$

C 1.69×10^{-3}, $\frac{-13}{5}$, 6%, $2.\overline{13}$, $\sqrt{3}$

D 1.69×10^{-3}, $\frac{-13}{5}$, 6%, $\sqrt{3}$, $2.\overline{13}$

Common Core Standard: 7.EE.2, F-BF.3
Mathematical Practice: *Reason abstractly and quantitatively.*

2. Let $y = \frac{x}{3}$. If x is doubled, what happens to y?

A y is doubled.

B y is divided by 2.

C y is multiplied by 6.

D y is tripled.

Common Core Standard: 7.SP.7.b
Mathematical Practice: *Reason abstractly and quantitatively.*

3. Jenny has a bag of lollipops leftover from Halloween. There are 6 cherry, 5 lemon, 2 grape, 3 orange and 4 lime. What is the probability that Jenny randomly chooses a cherry lollipop?

A $\frac{3}{10}$

B 30%

C 0.3

D All of the above

1. **(B)** To order the numbers from least to greatest without using a calculator, begin by determining the smallest number in the list which is the only negative number, $\frac{-13}{5}$. Although 1.69×10^{-3} has a negative exponent, that does not change the sign of the number itself. The negative exponent will move the decimal point three place values to the left as opposed to the right (if the exponent was positive) as shown below:

$$1.69 \times 10^{-3} = 0.00169$$

The largest number is either $2.\overline{13}$ or $\sqrt{3}$. To estimate the value of $\sqrt{3}$, find a perfect square less than 3 and a perfect square greater than 3:

$$\sqrt{1} < \sqrt{3} < \sqrt{4}$$
$$1 < \sqrt{3} < 2$$

Because $\sqrt{3}$ is less than 2, $2.\overline{13}$ is the larger number. Only choice B lists $\frac{-13}{5}$ as the smallest number and $2.\overline{13}$ (which is equal to 2.13131313….) as the largest number. The numbers in order from least to greatest are:

$$\frac{-13}{5},\ 1.69 \times 10^{-3},\ 6\%, \sqrt{3}, 2.\overline{13}$$

2. **(A)** It is often simpler to choose a value for x and compare the original equation to the new equation in which x is doubled. Consider the example when $x = 12$ and then double it to let $x = 24$:

	$y = \frac{x}{3}$		$y = \frac{x}{3}$
Substitute ($x = 12$):	$y = \frac{12}{3}$	Substitute ($x = 24$):	$y = \frac{24}{3}$
Simplify:	$y = 4$	Simplify:	$y = 8$

Because 8 is twice the value of 4, y doubles when x is doubled.

It is also possible to determine the change algebraically. If one side of the equation is doubled (multiplied by 2), then the other side must also be multiplied by 2:

$$y = \frac{x}{3}$$

Multiply both sides by 2: $2y = \frac{2x}{3}$ (Again, y doubles when x is doubled.)

3. **(D)** Theoretically each lollipop is equally likely to be chosen. Find the total number of lollipops in the bag by adding the number of each flavor: $6 + 5 + 2 + 3 + 4 = 20$.

$$\text{Probability is the } \frac{\text{number of favorable outcomes}}{\text{total number of possible outcomes}} = \frac{\text{6 cherry lollipops}}{\text{20 lollipops}} = \frac{6}{20} = \frac{3}{10}$$

Note that $\frac{3}{10}$ could also be written as the decimal 0.3 (divide the numerator by the denominator if necessary) which is equal to 30% (multiply the decimal by 100). All three choices represent the same number. The correct choice is D, all of the above.

Solutions to Page 60

Common Core Standard: 8.EE.7.b, A-REI.3
Mathematical Practice: *Reason abstractly and quantitatively.*

1. Solve for x: $-9(x - 4) = 6 - 2(x + 8)$

   A $\frac{-58}{7}$

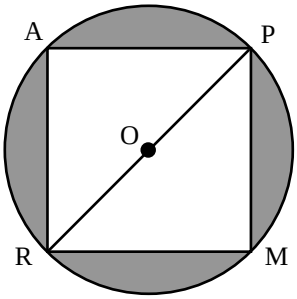
   B $\frac{-12}{13}$

   C $\frac{4}{13}$

   D $\frac{46}{7}$

Common Core Standard: 7.G.4, 7.G.6, 8.G.7
Mathematical Practice: *Make sense of problems and persevere in solving them.*

2. Square PARM is inscribed in circle O. If the diameter of the circle is 24 mm, find the area of the shaded region.



   A $(24\pi - 144)$ mm^2

   B $(36\pi - 72)$ mm^2

   C $(144\pi - 288)$ mm^2

   D $(576\pi - 576)$ mm^2

Common Core Standard: 6.EE.3, A-SSE.3
Mathematical Practice: *Look for and make use of structure.*

3. Simplify: $(3x + 7)^2$

   A $6x^2 + 14$

   B $6x^2 + 20x + 14$

   C $9x^2 + 49$

   D $9x^2 + 42x + 49$

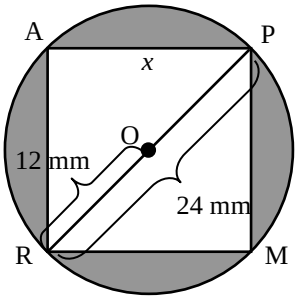
1. **(D)** Solve for x as follows:

	$-9(x-4) = 6 - 2(x+8)$
Distribute -9:	$-9x + 36 = 6 - 2(x+8)$
Distribute -2:	$-9x + 36 = 6 - 2x - 16$
Combine $6 - 16$:	$-9x + 36 = -10 - 2x$
Add $2x$ to both sides:	$-7x + 36 = -10$
Subtract 36 from both sides:	$-7x = -46$
Divide both sides by -7:	$x = \frac{46}{7}$

Recall the order of operations: multiplication before subtraction. Also the sign refers to the term that it precedes.

2. **(C)** The area of the shaded region can be found by taking the difference between the area of the outer region (the circle) and the area of the inner region (the square). If the diameter of the circle is 24 mm, the radius (r) is 12 mm. Using the Formula Sheet, find the area of the circle as follows:

$$A = \pi r^2 = \pi(12)^2 = \pi \bullet 144 = 144\pi \text{ mm}^2$$



To find the area of the square, determine the length of the side (x). (Recall that the sides of a square are congruent). Because a square has four right angles, ΔAPR is a right triangle. Use the Pythagorean Theorem to find the length of the side of the square.

	$a^2 + b^2 = c^2$
Substitute lengths:	$x^2 + x^2 = 24^2$
Combine like terms:	$2x^2 = 24^2$
Simplify:	$2x^2 = 576$
Divide both sides by 2:	$x^2 = 288$
Take the square root of both sides:	$x = \sqrt{288}$

In geometry, only the principal square root which is the positive root is needed.

Simplify the square root: $\sqrt{288} = \sqrt{144 \bullet 2} = \sqrt{12 \bullet 12 \bullet 2} = 12\sqrt{2}$

To find the area of the square (which is also a rectangle), use the area formula given on the Formula Sheet: $A = lw$. In this case, the length (l) and width (w) are both $12\sqrt{2}$ mm.

Substitute values:	$A = (12\sqrt{2})(12\sqrt{2})$
Re-order if necessary:	$A = 12 \bullet 12 \bullet \sqrt{2} \bullet \sqrt{2}$ (Commutative Property of Multiplication)
Simplify:	$A = 144 \bullet 2 = 288 \text{ mm}^2$

Area of the shaded region:	Area of Circle – Area of Square
Substitute values:	$(144\pi - 288) \text{ mm}^2$

3. **(D)** To simplify this expression, recall that an exponent indicates how many times the base is used as a factor. In this case, the base is $3x + 7$ which is used a factor (multiplied) twice. Rewrite $(3x + 7)^2$ as $(3x + 7)(3x + 7)$. Multiply each term of the first binomial by each term of the second binomial. The process is shown below:

$$(3x + 7)(3x + 7) =$$

	FIRST TWO TERMS		*OUTER TERMS*		*INNER TERMS*		*LAST TERMS*
Multiply terms:	$3x \bullet 3x$	+	$3x \bullet 7$	+	$7 \bullet 3x$	+	$7 \bullet 7 =$
Simplify:	$9x^2$		$+ 21x$		$+ 21x$		$+ 49 =$
Combine like terms:	$9x^2 + 42x + 49$						

Solutions to Page 76