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| GED/HSE Class 23 |
| GED Practice Set 3  |
| 25-36 Study Edition |

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| Kevin Adams |

1. (b) All of our answer choices are in the slope-intercept form.

$$y=mx+b$$

$m$ represents the slope, and $b$ represents the y-intercept.

The line is moving downward, so we know that the slope must be a negative value.

The line crosses the y-axis at y=1, so we know that $b=+1$.

2. (c) When we subtract polynomials, we must change it into an addition problem and change every value in the second polynomial into its opposite.

$$3a^{2}b+\left(-2a^{2}b\right)=a^{2}b$$

$$-5ab+3ab=-2ab$$

$$4ab^{2}+\left(-2ab^{2}\right)=2ab^{2}$$

We have:

$$a^{2}b-2ab+2ab^{2}$$

1. What is the equation, in slope-intercept form, of the line shown on the graph?



(a) $y=\frac{2}{3}x+1 $ (b) $y=-\frac{2}{3}x+1$

(c) $y=\frac{2}{3}x-1$ (d) $y=-\frac{2}{3}x-1$

2. Subtract.

$$\left(3a^{2}b-5ab+4ab^{2}\right)-\left(2a^{2}b-3ab+2ab^{2}\right)$$

(a) $5a^{2}b-8ab+6ab^{2}$

(b) $5a^{2}b+2ab-2ab^{2}$

(c) $a^{2}b-2ab+2ab^{2}$

(d) $a^{2}b+2ab-2ab^{2}$

3. What is the value of $x$ in this system of equations?

$$2x+3y=8$$

 $x-3y=4$

(a) $1$ (b) $2$

(c) $3$ (d) $4$

3. (d)

We can eliminate the $y$-term by adding the equations together.

Then we solve for $x$.

$$\overline{\begin{array}{c}2x+3y=8\\ x-3y=4\\+ \end{array}}$$

$$ 3x =12$$

$$x=4$$

4. (a) Andrew has $x comics.$

 Joey has one *fewer* than that:

$$x-1$$

 Armando has *twice as many*  as Joey

$$2\left(x-1\right)$$

When we expand that using the distributive property, it becomes $2x-2$

$$2\left(x-1\right)=2x-2$$

5. (c) We must find the **surface area** of the sphere using the formula provided on the formula sheet.

$$SA=4πr^{2}$$

The **diameter** of the sphere is 10, so its **radius** is 5.

$$r=5$$

Calculate.

$$4π\left(5\right)^{2}=4π\left(25\right)=100π≈314$$

Each can of paint can cover 80 square feet.

$$314÷80=3.925$$

Four cans will be needed to cover the entire disco ball.

4. Andrew, Joey, and Armando all have comic book collections. Andrew has $x$ comic books. Joey has one fewer comic book than Andrew. Armando has twice as many comic books as Joey. Which expression represents the number of comics in Armando’s collection?

(a) $2x-2$

(b) $2x+2$

(c) $2(x-x+1)$

(d) $2(2x+1)$

5. At the City of Kyle’s New Year’s Eve Celebration, a giant spherical disco ball is going to be suspended from the top of City Hall. The disco ball measures 10 feet across, and is going to be painted solid gold. Each can of specialty paint can cover 80 square feet. How many cans of paint will the painters need to have on hand?

(a) $2$

(b) $3$

(c) $4$

(c) $5$

1. Which line on the graph represents the equation $2x+y=-3$?



 **A**

 **B**

 **C**

 **D**

2. If $h\left(t\right)=-2t^{2}-4t+16$, what is $h(-3)$?

1. (a) Our equation is given in standard form. We can solve by either converting it to slope-intercept form or finding the $x-$ and $y-$intercepts.

$$2x+y=-3$$

$$-2x -2x$$

$$y=-2x-3$$

Or:

$$2x+y=-3 x=0$$

$$2\left(0\right)+y=-3$$

$$y=-3$$

$$\left(0, -3\right)$$

and

$$2x+y=-3 y=0$$

$$2x+0=-3$$

$$2x=-3$$

$$x=-\frac{3}{2}$$

$$\left(-\frac{3}{2}, 0\right)$$

2. (a) Substitute $-3$ into the function where we see an $t$.

**PUT IT BY ITSELF INSIDE PARENTHESES!**

$$-2t^{2}-4t+16$$

$$-2\left(-3\right)^{2}-4\left(-3\right)+16$$

Press enter, and voila.

We can also evaluate this function without a calculator if we pay close attention to the order of operations.

$$-2\left(-3\right)^{2}-4\left(-3\right)+16$$

$$-2\left(9\right)-4\left(-3\right)+16$$

$$-18+12+16=10$$

3. (c) The denominator cannot equal zero. What values of $x$ will result in a denominator of zero?

$x(x-5)$ is a multiplication problem. What values for $x$ will make the product $0$?

$$x=0$$

and

$$x-5=0$$

$$ +5 +5$$

$$ x=5$$

(a) $10$

(b) $46$

(c) $-80$

(d) $-96$

3. For what value or values of $x$ is the following expression undefined?

$$\frac{2x}{x(x-5)}$$

(a) $x=0$ (b) $x=5$ (c) $x=0 or 5$ (d) $x=0 or-5$

4. Which expression is the same as $6x^{2}+12x$?

(a) $18+x^{3}$

(b) $72x^{3}$

(c) $6x\left(x+2\right)$

4. (c) We can extract common factors from an expression in order to simplify it. Begin with the constants—the ordinary numbers—and then tackle the variables.

Do 6 and 12 share a common factor? Yes: 6. We can “pull” a 6 out of both terms.

Do $x^{2}$ and $x$ share a common factor? Yes: $x$.

$$6x$$

What are we left with?

$$\left(x+2\right)$$

$$6x\left(x+2\right)$$

In *this* problem, we can also work backwards from the choices.

5. (a) We’ll need to use the formula for the volume of a sphere.

$$V=\frac{4}{3}πr^{3}$$

We’re given that the diameter is 10. The radius is half of the diameter. $r=5$

$$V=\frac{4}{3}π\left(5\right)^{3}$$

We can enter this directly into the calculator, and it will tell us

$$=\frac{500π}{3}.$$

Press the button and it will convert to decimal form $523.5987756.$

$$≈523.6$$

6. (c) Solve by treating the fraction as a division problem.

 $0.71$

$$7\overline{)5.000}$$

 $\overline{- 49}$

 $10$

We can stop here: we now know that $\frac{5}{7}$ will be more than $0.7$ and less than $0.8$.

(d) $(6x^{3})(12x)$

5. The diameter of a spherical balloon is 10 inches. To the nearest tenth, how many cubic inches of air can it hold?

(a) $523.6$

(b) $4188.8$

(c) $5260.2$

(d) $5261.1$



6. **(No Calculator.)** Between which two points would we find $\frac{5}{7}$ on a number line?

(a) 0.5 and 0.6 (b) 0.6 and 0.7

(c) 0.7 and 0.8 (d) 0.8 and 0.9

Questions 1-3 refer to the following table.

1. (2) To find the slope of a line, use the formula.

$$\frac{∆y}{∆x}=\frac{change in y}{change in x}=\frac{y\_{2}-y\_{1}}{x\_{2}-x\_{1}}$$

We can choose any two points as $(x\_{1}, y\_{1)}$ and $\left(x\_{2}, y\_{2}\right).$ The answer will always be the same.

$$\frac{5-3}{2-1}=\frac{2}{1}=2$$

2. ($-\frac{1}{2}$). A **perpendicular** line has the **opposite inverse** slope.

 The **opposite** of positive is negative.

To find the **inverse** of a number, we flip it upside down. Here, it’s helpful if we remember that every whole number has an “invisible” denominator of 1.

$$2=\frac{2}{1}\rightarrow \frac{1}{2}$$

3. ($y=2x+1) $Hopefully we think of the **slope-intercept form** of a line when we see something like this.

$$y=mx+b$$

$$m=slope$$

$$b=y-intercept$$

We’ve already determined, in problem 1, the **slope** of this line: $m=2$.

We can use any of the ordered pairs on the table to solve for $b$.

$$y=mx+b$$

$$y=2x+b$$

$$\left(0, 1\right) x=0, y=1$$

$$1=2\left(0\right)+b$$

$$1=b$$

$$b=1$$

$$y=2x+1$$

|  |  |
| --- | --- |
| $$x$$ | $$y$$ |
| 0 | 1 |
| 1 | 3 |
| 2 | 5 |
| 3 | 7 |
| 4 | 9 |

1. What is the slope of the line represented in the table?

2. What is the slope of a line perpendicular to the line represented in the table?

3. What is the equation of the line represented in the table?

$$y$$

 $=$ $x$

$$2$$

$$1$$

$\frac{1}{2}$

$$-$$

$$+$$

4. Which expression and solution on the number line represents the inequality, *three more than the product of a number and two is greater than or equal to nine*?

(a) $3n+2>9$



(b) $3n+2\geq 9$



(c) $2n+3>9$

4. (d) A **product** is the result of multiplication. When we show the product of a constant and a variable, we write the constant first. “The product of a number and two” is $2n$.

 “Three more” than that is $2n+3.$

$$2n+3\geq 9$$

$$ -3 -3$$

$$2n\geq 6$$

$$\frac{2n}{2}\geq \frac{6}{2}$$

$$n\geq 3$$

5. (a) The formula for the volume of a cone is provided:

$$V=\frac{1}{3}πr^{2}h$$

$$r=5 h=12$$

$$V=\frac{1}{3}π\left(5\right)^{2}\left(12\right)$$

$$=\frac{1}{3}π\left(25\right)\left(12\right)$$

We can evaluate this easily with or without a calculator if we recognize it as a pure multiplication problem. *We can perform multiplication in any order!*

$$\frac{1}{3}\left(12\right)=4$$

$$4\left(25\right)=100$$

$$100\left(π\right)=100π$$

6. (0.27) Remember: fractions are a kind of division.

$\frac{3}{11}=$ 3 divided by 11

$$11\overline{) 3.00000}$$



(d) $2n+3\geq 9$



 5. A cone is shown. What is its volume, in cubic units?

 (a) $100π$

 (b) $300π$

12

 (c) $400π$

 (d) $600π$

10

6. Without using a calculator, express $\frac{3}{11}$ in decimal form, rounded to the nearest hundredth.

1. What is the slope of the line represented by the equation?

$$2x+4y=8$$

(a) $-\frac{1}{2}$

(b) $\frac{1}{2}$

(c) $-2$

1. (a) If we convert this linear equation into **slope-intercept form**, then whatever ends up in front of the $x$ will be the slope of the line!

We want to work with this equation until it looks something like $y=mx\pm b$.

$$2x+4y=8$$

 $-2x -2x$

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

$$\frac{4y}{4}=-\frac{2x}{4}+\frac{8}{4}$$

$$y=-\frac{1}{2}x+2$$

The slope of this line is $m=-\frac{1}{2}$

2. (b) We’ll need to recognize this as a quadratic equation, and copy the quadratic formula onto our scratch paper.

$$x=\frac{-b\pm \sqrt{b^{2}-4ac}}{2a}$$

We’ll also need to “set the equation to zero” by subtracting 8 from both sides.

$$3x^{2}+2x-8=0$$

$$a=3 b=2 c=-8$$

First, tackle the “discriminant:” the square root problem. Enter into the calculator

$$\left(2\right)^{2}-4\left(3\right)\left(-8\right)$$

$$=100$$

Take the square root of 100

$$\sqrt{100}=10$$

Now substitute.

$$\frac{-2\pm 10}{2\left(3\right)}$$

$=\frac{-2+10}{6}$ or $=\frac{-2-10}{6}$

$=\frac{8}{6}=\frac{4}{3}$ or $=\frac{12}{6}=-2$

(d) $2$

2. What is a possible value of $x$ in this equation?

$$3x^{2}+2x=8$$

(a) $-\frac{4}{3}$

(b) $\frac{4}{3}$

(c) $2$

(d) $0$

3. Multiply: $\left(2x-y\right)\left(3x+y\right)$

(a) $6x^{2}-xy-y^{2}$

(b) $5x^{2}-xy-y^{2}$

(c) $6x^{2}-xy-2y^{2}$

(d) $5x^{2}-xy-2y^{2}$

4. A restaurant serves build-your-own bowls, where each customer selects a protein, a grain, and any 2 vegetables for his or her bowl. There are 6 choices of vegetable. How many combinations of 2 different vegetables are possible?

(a) $12$

(b) $15$

(c) $30$

(d) $36$

3. (a) Expand the binomials by using the FOIL technique.

$$\left(2x-y\right)\left(3x+y\right)$$

First terms: $\left(2x\right)\left(3x\right)=6x^{2}$

Outside terms $\left(2x\right)\left(y\right)=2xy$

Inside terms $\left(-y\right)\left(3x\right)=-3xy$

Last terms $\left(-y\right)\left(y\right)=-y^{2}$

$$=6x^{2}+2xy-3xy-y^{2}$$

Combine like terms:

$$=6x^{2}-xy-y^{2}$$

4. (b) Since this is a **combination**, we’ll need to make a little chart. Begin by naming the six vegetables: a, b, c, d, e, f

ab bc cd de ef

ac bd ce df

ad be cf

ae bf

af

Now count them up: 5+4+3+2+1=15

5. (b) Call the width of the rectangle $x$. The length is then $3x$. Substitute these values into the formula for the area of a rectangle.

$$A=lw$$

$$lw=A$$

$$x\left(3x\right)=48$$

$$3x^{2}=48$$

$$\frac{3x^{2}}{3}=\frac{48}{3}$$

$$x^{2}=16$$

$$x=4$$

5. A rectangle has a width that is given as $x$. The length of the rectangle is three times larger than its width. The area of the rectangle is 48 square units. What is the value for $x$?

(a) $3$

(b) $4$

(c) $6$

(d) 12

1. What is the equation, in slope-intercept form, of the line on the graph below?

 (a) $y=\frac{2}{3}x+4$

 (b) $y=-\frac{2}{3}x+4$

 (c) $y=-\frac{2}{3}x-4$

 (d) $3y=-2x+12$

2. Evaluate.

$$\left|-7\right|$$

(a) $-7$

(b) $7$

(c) $0$

(d) $14$

1. (b) The slope-intercept form of a line is found on the formula sheet.

$$y=mx+b$$

$m$ represents the slope of the line, which can be found by looking at any two points, from left to right, and asking how we got from one to the other:

$$\frac{∆y}{∆x}=\frac{change up and down}{change left to right}$$

Remember: up is positive, down is negative.

Left is negative, right is positive.

$$m=\frac{down 2}{to the right 3}=\frac{-2}{3}=-\frac{2}{3}$$

$b$ represents the $y-intercept$: the value of $y$ where the line crosses the $y$-axis.

$$b=4$$

$$y=-\frac{2}{3}x+4$$

2. (b) The absolute value of a number is its distance from 0 on the number line. It is never negative.

$$\left|-7\right|=7$$

3. Which algebraic inequality and solution on the number line represents *three less than the product of a number and two is less than or equal to nine*?

(a) $3-2x\leq 9$



(b) $2x-3\leq 9$



(c) $2x-3\geq 9$



(d) $\left(2+x\right)-3\leq 9$



4. Which of the following is an undefined expression in the set of real numbers?

(a) $\frac{x+2}{0}$ (b) $\sqrt{0}$ (c) $2^{-1}$ (d) $\frac{0}{-7}$

5. Simplify the following expression.

3. (b) The product of a number and 2 is $2x$.

“*three less than*” $2x$ is $2x-3$.

$$2x-3\leq 9$$

 $+3 +3$

 $2x\leq 12$

$$\frac{2x}{2}\leq \frac{12}{2}$$

$$x\leq 6$$

4. (a) When working with real numbers, there are only 2 undefined expressions that concern us:

$$\frac{n}{0} and \sqrt{-n }$$

We cannot divide by zero or have a denominator of zero.

We cannot take the square root of a negative number.

5. (d) When subtracting a polynomial, follow these steps:

Write the first polynomial exactly as it appears, but without the parentheses.

Then, change the minus sign into a plus sign.

Then change every term in the second polynomial into its opposite: every positive becomes a negative, and every negative/minus sign becomes a +.

 Finally, combine like terms.

$$2a^{2}b-5ab+3ab^{2}+\left(-3a^{2}b+4ab-3ab^{2}\right)$$

$$=-a^{2}b-ab$$

$$\left(2a^{2}b-5ab+3ab^{2}\right)-\left(3a^{2}b-4ab+3ab^{2}\right)$$

(a) $5a^{2}b-9ab+6ab^{2}$

(b) $5a^{2}b+ab+6ab^{2}$

(c) $-a^{2}b-ab+6ab^{2}$

(d) $-a^{2}b-ab$

1. What is the equation of the line shown on the following graph?



 (a) $3x+y=-1$ (b) $x+3y=-1$

 (c) $3x-y=-1$ (d) $x-3y=-1$

2. Rocky’s Ice Cream Parlor has a Saturday afternoon special: 2 scoops of any flavor of ice cream, 2 of any topping, and a choice of 3 different cones for $4.99.

 There are 12 flavors of ice cream to choose from, and 7 different toppings.

 How many possible ways could a customer to Rocky’s Ice Cream Parlor build a special?

(a) 22

(b) 252

(c) 7,056

(d) 21,168

1. We can solve this two different ways.

Find the slope-intercept form of the line and convert it to standard form:

$$y=mx+b$$

What is the slope of this line? Find any two points close to each other. Moving from left to right, how did we get from one to the other?

$$m=\frac{∆y}{∆x}=\frac{change up and down}{change left to right}$$

$$m=\frac{down 3}{1 to the right}=\frac{-3}{1}=-3$$

Where does our line cross the $y$-axis? At $-1$.

$$b=-1$$

$$y=-3x-1$$

 $+3x +3x$

$$3x+y=-1$$

Or we can choose two points on the line and see if the values for $x$ and $y$ make the equations true. The intercepts are usually the easiest points to work with.

$$\left(0, -1\right)$$

$$3\left(0\right)-1=-1? Yes$$

Check at least two points on the line.

$$\left(-1, 2\right)$$

$$3\left(-1\right)+2=-1? Yes$$

2. (d) We’ll use the “counting principlpe,” and multiply.

How many ways can we choose the first scoop? 12.

Second scoop? 12.

First topping and second topping? 7, 7.

Cone? 3

$$12×12×7×7×3=21,168$$

3. Without a calculator, evaluate $2^{3}$.

(a) 5 (b) 6 (c) 8 (d) 23

Karla is an interior house painter. To determine the cost, $C$, of a job, she charges $.05 per square foot, $s$, and an additional $30.00 per hour, $h$.

4. Write a formula that Karla could use to express how much she charges for a job.

 $C$ $= +$

 $.05$ $ 5$ $15$ $30$ $s$ $h$

5. If Karla spends 8 hours painting a rectangular room that is 30 feet wide and 40 feet long, how much will she charge for the job?

(a) $\$240.00$

(b) $\$300.00$

(c) $\$6,240.00$

(d) $\$36,000.40$

3. (c) $2^{3}=\left(2\right)\left(2\right)\left(2\right)=8$

4. $30/hr $×$ *h* number of hours =$30h$

 $.05/sqft $×$ *s* number of square feet = $.05s$

Either $30h+.05s$ or $.05s+30h$ is correct.

5. (b) Substitute 8 for $h$. $30(8)=240$

 We’ll need to find the area, in square feet, of the rectangular room in order to find the value of $s$.

$$A=lw$$

$$=\left(30\right)\left(40\right)$$

$$=1200$$

Now substitute 1200 for $s$, and multiply.

$$\left(.05\right)\left(1200\right)=60$$

$$240+60=300$$

1. What is the slope of the line represented in the table below?

|  |  |
| --- | --- |
| $$x$$ | $$y$$ |
| $$2$$ | $$-1$$ |
| $$5$$ | $$-3$$ |
| $$8$$ | $$-5$$ |
| $$11$$ | $$-7$$ |

 (a) $\frac{2}{3}$

 (b) $-\frac{2}{3}$

 (c) $\frac{3}{2}$

 (d) $-\frac{3}{2}$

2. What is the slope of a line perpendicular to the line represented by the equation $y=3x-1$

(a) $-1$

(b) $3$

(c) $-3$

(d) $-\frac{1}{3}$

3. Match each equation with its solution.

 $3x+2=1$ $20$

 $\frac{1}{2}x-4=6$ $2$

 $\frac{x-1}{3}=-5$ $-\frac{1}{3}$

1. (b) To find the slope of a line from a table, we can choose any two points.

$$m=\frac{∆y}{∆x}=\frac{y\_{2}-y\_{1}}{x\_{2}-x\_{1}}$$

$(x\_{1}, y\_{1})$ and $(x\_{2}, y\_{2})$ are the two points we choose.

I’ll choose the first two: $(2, -1)$ and $(5, -3)$

$$\frac{-3-\left(-1\right)}{5-2}=\frac{-3+1}{5-2}=\frac{-2}{3}=-\frac{2}{3}$$

2. (d) The slope of the line represented by the equation is $3$, since the equation is in slope-intercept form.

The slope of a line *perpendicular* to that will be the **opposite-inverse** of $3$. (Remember that 3 has an “invisible denominator” of 1!)

$$\frac{3}{1}\rightarrow -\frac{1}{3}$$

3. $3x+2=1$

 $-2 -2$

 $3x=-1$

 $\frac{3x}{3}=\frac{-1}{3}$

 $x=-\frac{1}{3}$

 $\frac{1}{2}x-4=6$

 $+4 +4$

 $\frac{1}{2}x=10$

**TO DIVIDE BY A FRACTION, MULTIPLY BY ITS INVERSE!**

 $\left(\frac{2}{1}\right)\frac{1}{2}x=\left(\frac{2}{1}\right)10$

 $x=20$

 $\frac{x-1}{3}=-5$

 $3\left(\frac{x-1}{3}\right)=\left(-5\right)3$

 $x-1=-15$

 $+1 +1$

 $x=-14$

 $x-4=-2$

 $+4 +4$

 $x=2$

 $x-4=-2$ $-14$

4. (c) Our answer choices are given in slope-intercept form,

$$y=mx+b$$

We’ll substitute the values we’re given for $,$ $y$, and $m$. Then we can solve for $b$.

$$x=4 y=2 m=-\frac{1}{2}$$

$$2=\left(-\frac{1}{2}\right)\left(4\right)+b$$

$$2=-2+b$$

$$-2+b=2$$

 $+2 +2$

$$b=4$$

$$y=-\frac{1}{2}x+4$$

5. (b) We’ll use the FOIL technique to multiply these binomials: First, Outside, Inside, Last.

$$\left(2x+1\right)\left(3x-3\right)$$

First: $\left(2x\right)\left(3x\right)=6x^{2}$

Outside: $\left(2x\right)\left(-3\right)=-6x$

Inside: $\left(1\right)\left(3x\right)=3x$

Last: $\left(1\right)\left(-3\right)=-3$

$$6x^{2}-6x+3x-3$$

$$=6x^{2}-3x-3$$

6. (c) The factors of a number are all of the values that can be multiplied to reach the number. A number is evenly divisible by all of its factors. 16 is a factor of both 16 and 80.

We can always find the GCF of two or more numbers by using **prime factorization**.

4. What is the equation of the line that passes through the point $(4, 2)$ and has a slope of $m=-\frac{1}{2}$?

(a) $y=-\frac{1}{2}x$

(b) $y=-\frac{1}{2}x+3$

(c) $y=-\frac{1}{2}x+4$

(d) $y=4x-2$

5. Expand $(2x+1)(3x-3)$.

(a) $6x^{2}+3x+3$

(b) $6x^{2}-3x-3$

(c) $5x+2$

(d) $5x-2$

6. What is the Greatest Common Factor that can be used to fully reduce this fraction?

$$\frac{16}{80}$$

(a) $2$

(b) $8$

(c) $16$

(d) $24$

1. What is the equation of the line that passes through the point $(2, -1)$ and has a slope of $-2$?

(a) $2x-y=-2$

(b) $2x-y=3$

(c) $2x+y=3$

(d) $2x+y=5$

1.(c) Find the slope-intercept form, and convert it to standard form.

$$y=mx+b$$

$$-1=-2\left(2\right)+b$$

$$-1=-4+b$$

$$-4+b=-1$$

 $+4 +4$

$$b=3$$

$$y=-2x+3$$

 $+2x +2x$

$$2x+y=3$$

2. (d) We are looking for a factor pair of $-8$ whose *sum* is $-2$.

One of our factors must be negative.

Because they add up to a negative number, the larger of the two factors must be negative.

$$\left(+\right)\left(-\right)$$

$$\left(1\right)\left(8\right)$$

$$\left(2\right)\left(4\right)$$

Our magic numbers are $+2$ and $-4$.

$$(x+2)(x-4)$$

3. (d) In the set of real numbers, the denominator of a fraction or rational expression cannot equal zero.

What value or values of $x$ will make $3x-6$ equal zero?

$$3x-6=0$$

 $+6 +6$

$$2x=6$$

$$\frac{2x}{2}=\frac{6}{2}$$

$$x=3$$

2. What are the factors of $x^{2}-2x-8$?

(a) $x-2$ and $x+8$

(b) $x+4$ and $x+2$

(c) $x+4$ and $x-2$

(d) $x-4$ and $x+2$

3. For what value or values of $x$ is the following expression undefined in the set of real numbers?

$$\frac{2x}{3x-6}$$

(a) $x=-2$

(b) $x=0$

(c) $x=2$

(d) $x=3$

4. Which of the following tables does *not* represent a function?

|  |  |
| --- | --- |
| **Input** | **Output** |
| 3 | 7 |
| 6 | -7 |
| 9 | 7 |
| 12 | -7 |
| 15 | 7 |

|  |  |
| --- | --- |
| **x** | **y** |
| -1 | 10 |
| 0 | 2 |
| -1 | 10 |
| 0 | 2 |
| -1 | 10 |

 (a)

 (b)

|  |  |
| --- | --- |
| $$x$$ | $$f(x)$$ |
| $$-4$$ | $$16$$ |
| $$-2$$ | $$4$$ |
| $$0$$ | $$0$$ |
| $$2$$ | $$4$$ |
| $$4$$ | $$16$$ |

|  |  |
| --- | --- |
| **Input** | **Output** |
| $$1$$ | $$4$$ |
| $$2$$ | $$6$$ |
| $$3$$ | $$8$$ |
| $$1$$ | $$-4$$ |
| $$2$$ | $$-6$$ |

 (c)

 (d)



5. A cubical box has a volume of 3375 cubic inches. What is the

length of each of its sides, in inches?

(a) $15$

(b) $58$

(c) $174$

(d) $1,125$

4. (d) For a relationship to be a **function**, any “input” must have a predictable and consistent “output.” If we input a value more than once, it has to give us the same output.

In Table D, the same input gives us different outputs! It is not a function.

5.(a) A cube is a rectangular prism which has length, width, and height of equal value.

All of its sides are the same.

$$V=\left(s\right)\left(s\right)\left(s\right)$$

$$v=s^{3}$$

$$s^{3}=3375$$

$$\sqrt[3]{s^{3}}=\sqrt[3]{3375}$$

$$s=15$$

To find a cubic root using the calculator:

Press

Then enter the value into the radical.

1. Recently, an ocean-going oil tanker had an oil spill while it was at sea. Scientists studying the growth of the oil spill discovered that its area, in square feet, could be described by the equation

$$a\left(t\right)=1.3t^{2}-2.3t+1602.4$$

after $t$ number of days. What was the area of the oil spill, in square feet, after 7 days?

 Enter your answer in the box below.

2. Which line on the coordinate plane below represents the equation $x+3y=-12$?



 **A B C**

 **D**

1. (1650) This equation is written in **function notation**. In the equation, $t$ represents the number of days. Substitute 7 for $t$ into the equation. On the calculator, enter:

$$1.3\left(7\right)^{2}-2.3\left(7\right)+1602.4$$

When you press enter, the answer will be shown.

2. (d) We can rearrange the linear equation so that it is in slope-intercept form:

$$x+3y=-12$$

 $-x -x$

$$3y=-x-12$$

$$\frac{3y}{3}=\frac{-x}{3}-\frac{12}{3}$$

$$y=-\frac{1}{3}x-4$$

We are looking for a line which crosses the y-axis at -4 and is going downhill at a rate of $\frac{down 1}{3 to the right} $between any two points.

Or we can find the x- and y-intercepts:

If $x=0$, then $0+3y=-12$

$$3y=-12$$

$$\frac{3y}{3}=\frac{-12}{3}$$

$$y=-4$$

$(0, 4)$ is a point on this line. But there are two lines that share this point? Which one is it?

If $y=0$, then $x+3\left(0\right)=-12$

$$x=-12$$

$(-12, 0)$ is a point on the line. Though this point is not shown on the graph, it becomes clear which of the two lines it must be.

3. Without a calculator, evaluate the following expression.

$$\frac{2^{5}}{2^{3}}$$

(a) $-4$ (b) $0$ (c) $4$ (d) $8$

4. Evan is coating a cylindrical propane tank, illustrated below, with reflective paint. Each can of paint can cover 36 square feet. How many cans of paint will Evan need?

(a) 3

(b) 7

6

(c) 17

(d) 18

10

5. Destiny conducted a survey in which she asked people to choose their favorite color. She recorded the results in the table below.

The data for the color blue were erased, but Destiny remembers that the average (mean) for all colors was 37.

How many people chose blue as their favorite color?

|  |  |
| --- | --- |
| **Color** | **Number of People** |
|  Yellow | 32 |
| Red | 38 |
| Blue |  |
| Green | 36 |
| Purple | 34 |

3. (c) When dividing with exponents that share the same base, subtract: top minus bottom.

$$\frac{2^{5}}{2^{3}}=2^{5-3}=2^{2}=4$$

We can visualize this for a better understanding.

$$\frac{2^{5}}{2^{3}}=\frac{\left(2\right)\left(2\right)\left(2\right)\left(2\right)\left(2\right)}{\left(2\right)\left(2\right)\left(2\right)}=\left(2\right)\left(2\right)=4$$

4. (b) We will need to find the surface area of this cylinder.

$$SA=2πr^{2}+2πrh$$

(This is the area of the two circles, plus the area of the “rectangle” we would get by unfolding the cylinder: circumference times height.)

The height, $h$, is always the distance between the two circles.

$$r=3 h=10$$

$$2π\left(3\right)^{2}+2π\left(3\right)\left(10\right)=78π$$

Divide this by the number of square feet each can will cover.

Evan will need 7 cans of paint.

5.(c) Let $x$ represent the missing number. To find any average or mean value, we add up all of the values, and divide the sum by the number of values.

Here, we know that the average came out to 37.

$$\frac{x+32+38+36+34}{5}=37$$

$$\frac{x+140}{5}=37$$

$$5\left(\frac{x+140}{5}\right)=\left(37\right)5$$

$$x+140=185$$

 $-140 -140$

$$x=45$$

(a) 35 (b) 37 (c) 45 (d) 47

**Questions 1-5 refer to the following equation.** $y=\frac{3}{4}x-2$

1. $\left(\frac{3}{4}\right)$ This linear equation is in slope-intercept form.

$$y=mx+b$$

The slope is $m$, the value in front of the $x$

$$m=\frac{3}{4}$$

2. (c) Parallel lines have the exact same slope.

3. (d) Perpendicular lines have the **opposite-inverse** slope. The opposite of positive is negative. To find the inverse of a number, flip it upside down.

$$\frac{3}{4}\rightarrow -\frac{4}{3}$$

4. (c) We are looking for a line that crosses the y-axis at $-2$ and is going *uphill* from left to right at a rate of exactly

$$\frac{up 3}{4 to the right}$$

between points.

1. What is the slope of the line represented by the equation?

2. What is the slope of a line parallel to the line represented by the equation?

(a) $-2$ (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) $-\frac{4}{3}$

3. What is the slope of a line perpendicular to the line represented by the equation?

(a) $-2$ (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) $-\frac{4}{3}$

4. Which of the following lines illustrates the line represented by the equation?



 **A**

 **B**

 **C**

 **D**

5. Which algebraic inequality and solution represents *three less than the product of a number and negative five is greater than twenty two*?

5. (d)“The product of a number and negative five” is $-5n$.

“Three less” than that is $-5n-3$.

$$-5n-3>22$$

 $+3 +3$

$$-5n>25$$

$$\frac{-5n}{-5}>\frac{25}{-5}$$

$$n<-5$$

If we multiply or divide both sides of an inequality by a negative, we must reverse the sign.

6. (c) The Fundamental Counting Principle tells us that if we can do *one* thing in a certain number of ways ($m$) and *another thing* in a certain number of ways ($n$), then we use multiplication to find out how many ways we can do *both* things ($mn$). It works for any number of things.

Imagine 4 slots for the paintings. How many ways can we choose the first? 7. How many ways can we choose the second? 6—since we’ve already chosen one. And so on.

$$7×6×5×4=840$$

7. (b) This entire thing is one multiplication problem. We can multiply in any order.

$$a^{5}b^{4}×a^{2}b^{3}=\left(a^{5}\right)\left(a^{2}\right)\left(b^{4}\right)\left(b^{3}\right)$$

Add up the exponents for each base to find out how many times it’s being multiplied by itself in total.

$$a^{7}b^{7}$$

8. (b) Use the formula for the perimeter of a rectangle. Substitute the values we’re given, and solve for the length, $l$.

$$2w+2l=P$$

$$2\left(6\right)+2l=36$$

$$12+2l=36$$

 $-12 -12$

$$2l=24$$

$$\frac{2l}{2}=\frac{24}{2}$$

$$l=12$$

(a) $5n-3>22$ (b) $3-5n>22$

 $n>-5$ $n>5$

(c) $-5n-3>22$ (d) $-5n-3>22$

 $n>-5$ $n<-5$

6. Grace is hanging paintings in a cafe for an art exhibition. She is trying to decide between 7 different paintings, but there is only space to choose 4 of them. How many different arrangements of the 7 paintings does Grace have to choose from?

(a) 22 (b) 28 (c) 840 (d) 2401

7. Simplify $a^{5}b^{4}×a^{2}b^{3}$

(a) $a^{3}b$

(b) $a^{7}b^{7}$

(c) $a^{10}b^{12}$

(d) $42ab$

8. A rectangle has a width of 6 and a perimeter of 36. What is the length of the rectangle?

(a) 6 (b) 12 (c) 18 (d) 24

Questions 1 and 2 refer to the following chart.

1. Dorothy asked a group of friends and family members what each of their favorite kind of novel is. She made a pie chart to illustrate the results.

If 8 people chose Romance, how many people did Dorothy survey in all?

(a) 20 (b) 30 (c) 40 (d) 100

1. (c) Set up a proportionate ratio, and solve using cross-multiplication. Percentages always have a denominator of 100.

$$\frac{20}{100}=\frac{8}{x}$$

$$20x=800$$

$$\frac{20x}{20}=\frac{800}{20}$$

$$x=40$$

2. (b) “More than half” means *greater than 50%*. Only two categories can be added to give us more than 50%: Classics and Fantasy.

2. Which 2 categories, combined, made up more than half of the responses?

(a) Mystery and Classics (b) Fantasy and Classics

(c) Romance and Fantasy (d) Romance and Sci-Fi

3. Simplify $\frac{6a^{4}b^{3}c}{8a^{3}b^{4}c}$

(a) $14a^{7}b^{7}c^{2}$ (b) $48a^{12}b^{12}c$

(c) $\frac{3a}{4b}$ (d) $\frac{6abc^{8}}{8abc^{8}}$

4. Which expression below is the same as $4x^{3}-2x^{2}+12x$?

(a) $2x\left(2x^{2}-x+6\right)$

(b) $4x^{3}\left(1-2x^{2}+12x\right)$

(c) $x\left(4-2+12\right)$

(d) $2x\left(2x-2x+6x\right)$

3. (c) Reduce the normal numbers just like a normal fraction. A factor of $2$ can be canceled out. For the variables, how many exponents will be left after we cancel?

$$\frac{\left(a\right)\left(a\right)\left(a\right)\left(a\right)\left(b\right)\left(b\right)\left(b\right)\left(c\right)}{\left(a\right)\left(a\right)\left(a\right)\left(b\right)\left(b\right)\left(b\right)\left(b\right)\left(c\right)}$$

4. (a) We can factor out a $2$ and an $x$ from each term in the polynomial we’re given. What remains inside the parentheses is what’s left over after we’ve extracted the $2$ and one power of $x$.

In this instance, you can also solve by working backward from the answer choices, using distribution.

5. Using the expression that is supplied, substitute $16$ for $n$ and $7$ for $c$. Calculate.

$$12\left(16\right)+5\left(7\right)+6=233$$

5. Doug sells custom embroidered hats. To determine the cost of an order, he uses the formula

$$12n+5c+6$$

for $n$ number of hats ordered using $c$ number of different colors in the embroidery.

How much would an order for 16 hats using 7 colors cost?

1. What is the slope of the line that passes through the points $\left(2, -3\right)$ and $(4, 3)$?

(a) $-3$

(b) $-\frac{1}{3}$

(c) $\frac{1}{3}$

(d) 3

2. Subtract $\left(3a^{2}b+2ab-6ab^{2}\right)-\left(5a^{2}b-2ab+3ab^{2}\right)$

(a) $-2a^{2}b+4ab-3ab^{2}$

(b) $-2a^{2}b+4ab-9ab^{2}$

(c) $2a^{2}b-4ab+3ab^{2}$

(d) $8a^{2}b-3ab^{2}$

1.(d) Use the formula for slope. It doesn’t matter which point we start with.

$$\frac{3-\left(-3\right)}{4-2}=\frac{3+3}{4-2}=\frac{6}{2}=3$$

2. (b) Turn the subtraction problem into an addition problem by changing each sign in the second polynomial into its opposite.

$$3a^{2}b+2ab-6ab^{2}+\left(-5a^{2}b\right)+2ab+\left(-3ab^{2}\right)$$

$$=-2a^{2}b+4ab-9ab^{2}$$

3. (c) Using the decimal equivalents of the values we’re given, set up a proportionate ratio and solve using cross-multiplication.

$$\frac{1.5 in}{11 ft}=\frac{2.75 in}{ x ft}$$

$$1.5x=\left(11\right)\left(2.75\right)$$

$$1.5x=30.25$$

$$\frac{1.5x}{1.5}=\frac{30.25}{1.5}$$

$$x=20.1\overbar{6}≈20.2$$

3. On a scale drawing of a house floor plan, $1\frac{1}{2}$ inches represents 11 actual feet. If a certain wall on the drawing is $2\frac{3}{4}$ inches long, how long is the wall in real life? Round your answer to the nearest tenth of a foot.

(a) $.4$ feet

(b) $11.8$ feet

(c) $20.2$ feet

(d) $30.3$ feet

4. Susan is serving punch at a graduation party using conical paper cups. How many cups will Susan need if she is serving 5 gallons of punch into individual paper cups? ($1 gallon=231 in^{3})$. Answers are rounded to the nearest tens place.

3



5

(a) 10 (b) 20 (c) 80 (d) 100

5. What is the distance between $-17$ and $-9$ on a number line?

(a) $-26$

(b) $-8$

(c) 8

(d) $26$

4. (d) We’ll need to use the formula for the volume of a cone. This will tell us how many *cubic inches* ($in^{3}$) each cup will hold.

$$V=\frac{1}{3}πr^{2}h$$

The radius, $r$, of this cone is 1.5. The height, $h$, is 5.

Enter into the calculator:

$$\frac{1}{3}π\left(1.5\right)^{2}\left(5\right)≈11.78 in^{3}$$

How much punch does Susan need to serve? 5 gallons. Each gallon contains $231 in^{3}$.

$$5×231=1155$$

Divide this by the number of $in^{3}$ in a single cup.

$$1155÷11.78≈98.05$$

Rounded to the nearest *tens place* $=100$.

5. (c) To find the distance between two points, subtract. The answer will be the **absolute value** of the answer. Distance is never negative!

$$-17-\left(-9\right)=-17+9=-8$$

$$\left|-8\right|=8$$

or

$$-9-\left(-17\right)=-9+17=8$$

$$\left|8\right|=8$$

25. 1. b

 2. c

 3. d

 4. a

 5. c

26. 1. a

 2. a

 3. c

 4. c

 5. a

 6. c

27. 1. $m=2$

 2. $m=-\frac{1}{2}$

 3. $y=2x+1$

 4. d

 5. a

 6. $0.27$

28. 1. a

 2. b

 3. a

 4. b

 5. b

29. 1. b

 2. b

 3. b

 4. a

 5. d

30. 1. a

 2. d

 3. c

 4. $C=.05s+30h$

 or $C=30h+.05s$

 5. b

31. 1. b

 2. d

 3. $3x+2=1; x=-\frac{1}{3}$

 $\frac{1}{2}x-4=6; x=20$

 $\frac{x-1}{3}=-5; x=-14$

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

 4. c

 5. b

 6. c

32. 1. c

 2. d

 3. c

 4. d

 5. a

33. 1. 1650

 2. d

 3. c

 4. b

 5. c

34. 1. $m=\frac{3}{4}$

 2. c

 3. d

 4. c

 5. c

 6. b

 7. b

 8. b

35. 1. c

 2. b

 3. c

 4. a

 5. 233

36. 1. d

 2. b

 3. c

 4. d

 5. c