

# Mathematics I Resources for EOC Remediation

## CED – Creating Equations Cluster:

HSA-CED.A.1

HSA-CED.A.2

HSA-CED.A.3

HSA-CED.A.4

The information in this document is intended to demonstrate the depth and rigor of the Nevada Academic Content Standards. The items are **not** to be interpreted as indicative of items on the EOC exam. These are a collection of standard-based items for students and **only** include those standards selected for the Math I EOC examination.

## ***CED Creating Equations in Expressions Cluster***

**HSA-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.**

1. Pedro is doing some math exercises from a software program he recently purchased. In the program, you have to get at least 70% of the problems in an exercise right in order to gain proficiency. So far, Pedro answered one question, and he didn't get it right. Suppose he answers 75% of the following  $q$  questions correctly and gains proficiency in the exercise. Write an inequality in terms of  $q$  that models the situation.

**Answer:**  $\frac{0.75q}{q+1} \geq 0.7$

---

2. Angel has a total of \$24 to spend on lunch, which includes an 8% sales tax and a 12% tip. Write an inequality describing this situation and use this inequality to determine the most Angel can spend before tax and tip.

**Answer:** Let  $a$  be the amount that Angel can spend

$$1.12(a + 0.08a) \leq 24 \text{ (answers may vary)}$$

$$1.2a \leq 24$$

$$a \leq 20$$

Angel can spend no more than **\$20**.

---

3. A class of 46 students is separated into three groups. The first group has 2 more students than the second group and the third group is 2 times the size of the first group. Let  $x$  be the number of students in the second group.

**Part A:** Write an expression to represent each group.

**Part B:** How many students are in each group?

**Answer:** Part A: Group 1:  $x + 2$ , Group 2:  $x$ , Group 3:  $2(x + 2)$

Part B: Group 1 has 12 students, Group 2 has 10 students, Group 3 has 24 students

---

### ***CED Creating Equations in Expressions Cluster***

4. The length of the shortest side of a right triangle is 6 inches. The lengths of the other two sides are represented by consecutive even integers. (Hint: Pythagorean Theorem:  $a^2 + b^2 = c^2$ )

**Part A:** Write an equation that could be used to find the lengths of the other sides of the triangle.

**Part B:** Solve the equation in Part A and find the lengths of the missing sides.

**Answer:** Part A:  $6^2 + x^2 = (x + 2)^2$ , Part B: 8 inches and 10 inches

---

5. John can paint a house in 10 hours. Adam can paint the same house in 15 hours.

**Part A:** Write an equation that can be used to find the time in hours,  $t$ , it would take John and Adam to paint the house together.

**Part B:** Using the equation from Part A, find the total number of hours it would take for John and Adam to paint the house together.

**Answer:** Part A:  $\frac{1}{10}t + \frac{1}{15}t = 1$  or  $3t + 2t = 30$ , Part B: 6 hours

---

6. A manufacturing company produces three types of toothpastes: whitening, fresh breath, and sensitive. The list below shows information about the toothpastes.

- The company produces 4 times as many whitening toothpastes as sensitive toothpastes.
- The company produces 40 more fresh breath toothpastes than sensitive toothpastes.
- The ratio of the number of whitening toothpastes produced to the number of fresh breath toothpastes is 3: 1.

**Part A:** Write an equation that can be used to determine the number of sensitive toothpastes,  $s$ , the company produces in one day.

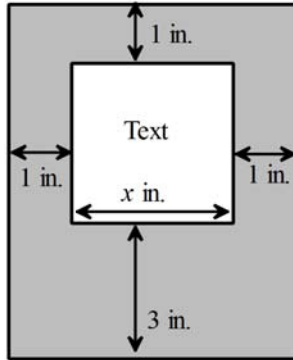
**Part B:** Based on the equation in Part A, how many sensitive toothpastes did the company produce in one day?

**Answer:** Part A:  $\frac{4s}{40+s} = \frac{3}{1}$ , Part B: 120 sensitive toothpastes

---

### CED Creating Equations in Expressions Cluster

7. A rectangular poster is designed so that the text is arranged in a square with a top, left, and right margin of 1 inch and a bottom margin of 3 inches. Justin determined the area of the shaded area.



**Part A:** Write an equation that Justin could use to justify the area of the shaded area.

**Part B:** Use your equation to solve for  $x$  if the area of the margin is  $44 \text{ in}^2$ .

**Answer:** Part A:  $A = (x + 4)(x + 2) - x^2$  or  $A = 6x + 8$ , Part B:  $x = 6$

---

8. Jeff is starting an exercise program. The first day he will spend  $\frac{2}{3}$  of an hour on the treadmill. He will increase his time on the treadmill by 3 minutes each day.

**Part A:** Write an equation representing  $T(d)$ , the time, in minutes, he spends on the treadmill on day  $d$ .

**Part B:** Find  $T(7)$ , the minutes he will spend on the treadmill on day 7.

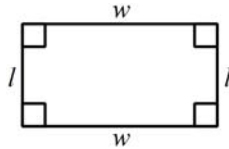
**Answer:** Part A:  $T(d) = 40 + 3(d - 1)$ , Part B: 58 minutes

---

## CED Creating Equations in Expressions Cluster

HSA-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

1. Use the diagram below to answer the following questions.



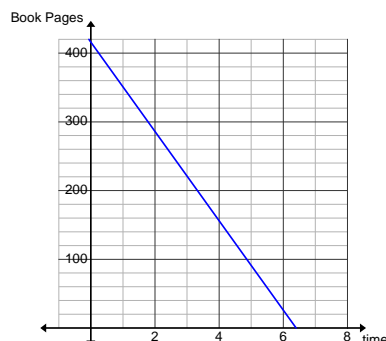
- Part A:** Write an equation to represent the perimeter  $P$  of the rectangle.
- Part B:** What is the width if the length is 11 cm and the perimeter is 38 cm?
- Part C:** Write an equation to represent the area  $A$ .
- Part D:** What is the length of the rectangle if the width is 7 cm and the area is  $84 \text{ cm}^2$ ?

**Answer:** Part A:  $P = 2w + 2l$ , Part B:  $w = 8 \text{ cm}$ , Part C:  $A = lw$ , Part D:  $l = 12 \text{ cm}$

---

2. Maria read a book cover to cover in a single session at a rate of 64 pages per hour. After reading for 5 hours, she had 416 pages left to read. Write an equation to determine the number of pages required to finish the entire book from this point. Graph the equation and find how many more hours it takes Maria to finish the book. What special point represents your answer on your graph?

**Answer:**  $B(t) = 416 - 64t$  It takes Maria 6.5 more hours to finish the book. The x-intercept represents the solution.



**CED Creating Equations in Expressions Cluster**

3. Match each equation to its graph or determine that the equation is NOT linear.

1.  $y + 4 = -\frac{3}{5}(x - 5)$

2.  $3xy = -5$

3.  $y + 4 = 5(x + 1)$

4.  $4x - 5y = -5$

5.  $y = \frac{4}{5}x + 1$

6.  $5x - y = -1$

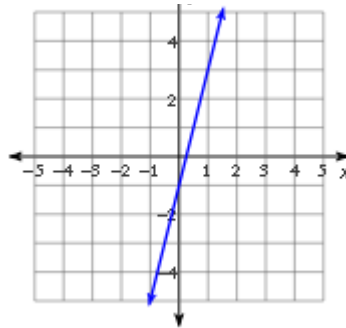
7.  $y = 4x - 1$

8.  $y = 4x^2 - 1$

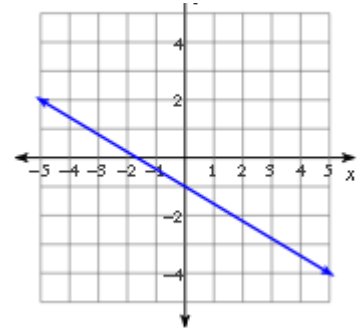
9.  $4x - y = 1$

10.  $y = -\frac{3}{5}x - 1$

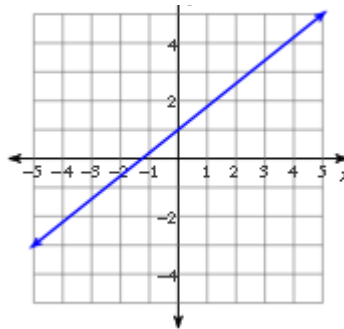
A.



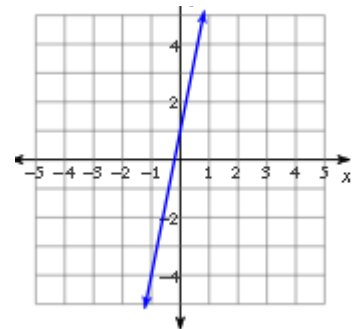
B.



C.



D.



E. NOT A LINEAR EQUATION

**Answer:**

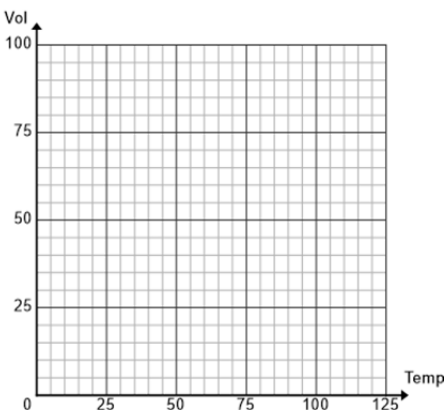
- |      |       |
|------|-------|
| 1. C | 6. D  |
| 2. E | 7. A  |
| 3. D | 8. E  |
| 4. B | 9. A  |
| 5. B | 10. C |

## CED Creating Equations in Expressions Cluster

4. In your chemistry class, you are asked to attempt to prove that there is a relationship between the temperature and volume of a particular gas. You measured the volume of the gas at 6 different temperatures and created a table with the following measurements.

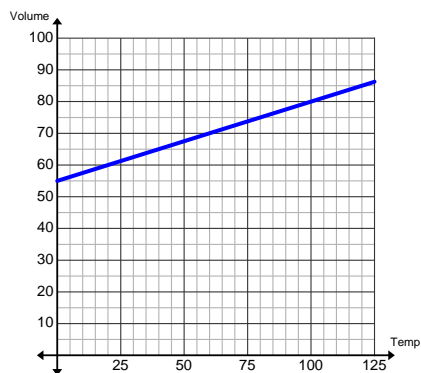
Temperature (Celsius)	Volume of Gas (mL)
20	60
40	65
60	70
80	75
100	80
120	85

Find a model for the relationship, graph it and then use your graph to find the volume of the gas when it is at 50°C .



**Answer:**

- Volume (ml) =  $\frac{1}{4}$  Temperature (C) + 55
- Volume of the gas when it is at 50°C is 67.5 ml



### ***CED Creating Equations in Expressions Cluster***

5. A softball team is holding a fundraiser to raise money for an out of state tournament. The team needs to raise \$1000.00 to attend the tournament. They will be selling T-shirts and visors. The T-shirts will be \$10.00 each and the visors will be \$5.00 each.
- A. Write an equation that models the situation described.
  - B. Explain what each variable represents.
  - C. Find three possible combinations that the team could sell in order to reach their goal.
  - D. What kind of numbers would the solutions have to be and why?

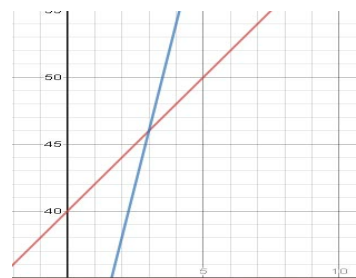
**Answer:**

- A.  $10t + 5v = 1000$
  - B.  $t$  = number of T-shirts sold,  $v$  = number of visors sold
  - C. 10 T-shirts and 180 visors, 50 T-shirts and 100 visors, 25 T-shirts and 50 visors
  - D. The numbers would have to be whole numbers because the team can only sell whole T-shirts and visors.
- 

6. Rachel wants to attend a dance class that is being offered twice a day. There are currently 40 people regularly going to the morning class, and attendance is increasing at a rate of 2 people per month. There are also currently 22 people regularly going to the evening class, and attendance is increasing at a rate of 8 people per month.
- a. Let  $P$  represent the total number of people in a class and  $m$  to represent the number of people joining per month. Develop a function that states the total number of people in each class.
  - b. Graph the functions from Part A.
  - c. Rachel wants to attend the less crowded class. Which class should she start in and which month should she switch to the other class?

**Answer:**

- a. Morning Class:  $P = 2m + 40$   
Evening Class:  $P = 8m + 22$



- b. Graph:
  - c. Rachel should start in the morning class. On the third month, the number of people attending both classes will be the same, so Rachel should switch to the evening class the fourth month.
-

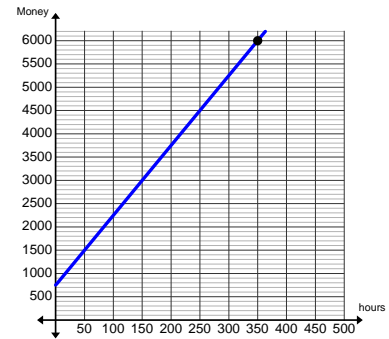


## CED Creating Equations in Expressions Cluster

7. Amy needs to earn \$6,000 to buy a used car. She has already saved up \$750.00 and her uncle has agreed to let her work at his car wash to earn the rest of the money. During the weekends she can work as a cashier for \$15 per hour.
- Write an equation to model this situation.
  - What does the  $y$  variable represent? Is it the dependent or independent variable?
  - What does the  $x$  variable represent? Is it the dependent or independent variable?
  - Graph the model and find out how many hours it will take Amy to earn the full \$6000.
  - How many 8 hour days of work will it take to earn the money needed?

### Answer:

- $y = 15x + 750$
- $y$  represents the dependent variable and is the total money saved in dollars
- $x$  represents the independent variable and is the number of hours worked
- See the Graph – 350 hours
- $350/8 = 43 \frac{3}{4}$  days = 44 days



---

**HSA-CED.A.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*

1. Jeremy plans to spend \$30 on sports cards. Regular cards cost \$2.50 per pack and foil cards cost \$5.00 per pack.
- Write an inequality that shows the relationship between the number of packs of regular cards ( $r$ ) and the number of packs of foil cards ( $f$ ) Jeremy can afford to buy.

**Answer:**  $2.5r + 5f \leq 30$

---

## ***CED Creating Equations in Expressions Cluster***

2. Katy plans to cut a 100-inch roll of ribbon into 4-inch and 8-inch strips of ribbon.

**Part A:** Write an inequality that can be used to determine the maximum number of 4-inch strips ( $x$ ), and the number of 8-inch strips ( $y$ ) Katy should be able to cut from the 100-inch roll of ribbon.

**Part B:** Select **ALL** possible ordered pairs that satisfy the inequality from Part A.

- A. (2,9)
- B. (12,7)
- C. (4,10)
- D. (15,5)
- E. (1,13)
- F. (8,8)

**Answer:** Part A:  $4x + 8y \leq 100$ , Part B: A, C, D, F

---

3. Rebecca is going to buy flour,  $f$ , at \$29.20 per 50-pound bag and sugar,  $s$ , at \$15.99 per 50-pound bag for her bakery.

**Part A:** Write an inequality that Rebecca could use to determine the number of bags of each she can buy without going over \$460.50?

**Part B:** How many bags of sugar can she buy if she buys 11 bags of flour?

**Part C:** Can Rebecca afford to buy 9 bags of flour and 13 bags of sugar? Explain your answer.

**Answer:** Part A:  $29.20f + 15.99s \leq 460.50$ , Part B: 8 bags of sugar, Part C: No, it will cost her \$470.67. OR No, she will be \$10.17 short of funds.

---

### ***CED Creating Equations in Expressions Cluster***

4. Marvin plans to put a fence around his rectangular lot. He remembers that the length of the lot is at least 52 feet. The cost of the fence along the length is \$2 per foot, and the cost of the fence along the width is \$3 per foot. He only has \$360 to complete the fence.
- A. Use two variables to write the system of inequalities that models the problem.
  - B. He measures and finds the length of the lot to be 60 feet. What is the maximum width of the lot?
  - C. If the cost of the fence along the length is discounted to \$1.50 per foot, and the cost of the fence along the width is discounted to \$2 per foot. What is the difference in the maximum width of the lot?

**Answer:**

- A. Let  $l$  be the length and  $w$  be the width

$$2(2l) + 2(3w) \leq 360$$

$$\begin{cases} 4l + 6w \leq 360 \\ l \geq 52 \\ w > 0 \end{cases}$$

- B.  $4(60) + 6w \leq 360$

$$240 + 6w \leq 360$$

$$6w \leq 120$$

$$w \leq 20$$

- C.  $2(1.50l) + 2(2w) \leq 360$

$$3l + 4w \leq 360$$

$$3(60) + 4w \leq 360$$

$$180 + 4w \leq 360$$

$$4w \leq 180$$

$$w \leq 45$$

The difference is  $45 - 20 = 25$  feet.

- 
5. Billy is buying T-shirts and shorts. T-shirts cost \$14 and shorts cost \$21. He plans on spending no more than \$147 and buy at least 8 items. Show and describe all combinations of the number of T-shirts and shorts he could buy.

$$x + y \geq 8$$

$$14x + 21y \leq 147$$

**Answer:** (8,0), (9,0), (10,0), (7,1), (8,1), (9,1), (6,2), (7,2), (5,3), (6,3), (4,4), (3,5)

## ***CED Creating Equations in Expressions Cluster***

6. In a college work study program, students may not work more than 20 hours per week. A student must serve at least 5 hours each week at each task, but may not spend more than 9 hours grading papers.

Let  $g$  = the number of hours a student spends grading papers.

Let  $t$  = the number of hours a student spends tutoring.

**Part 1:** Write a system of inequalities representing the imposed constraints

$$\text{Solution: } \begin{cases} g + t \leq 20 \\ 5 \leq g \leq 9 \\ 5 \leq t \leq 15 \end{cases}$$

**Part 2:** What are possible combinations of hours that the student could work. Select all that apply.

- A. 0 hours of grading and 20 hours of tutoring
- B. 0 hours of tutoring and 20 hours of grading.
- C. 3 hours of grading and 3 hours of tutoring.
- D. 5 hours of grading and 5 hours of tutoring.
- E. 8 hours of grading and 12 hours of tutoring.
- F. 9 hours of grading and 11 hours of tutoring.
- G. 10 hours of grading and 10 hours of tutoring.
- H. 6 hours of grading and 7 hours of tutoring.

**Answer:** D, E, F, H

---

### CED Creating Equations in Expressions Cluster

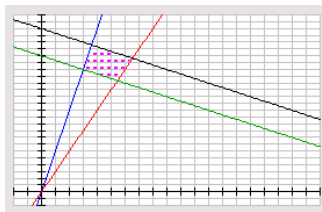
7. Mary is making a necklace 15 in. to 18 in. long. She will use two types of beads: brightly painted wooden ovals, 0.75 in. long that cost \$0.65 a piece and small animal shapes, 0.50 in. long that cost \$1.00 a piece. She wants to have at least three times as many ovals as animals, but not more than six times as many ovals as animals.
- Write inequalities to represent this situation.
  - Graph the feasible region.
  - How many of each type of bead should she buy to minimize her cost?

**Answer:**

- A.** Let  $x$  be the number of animal beads and  $y$  the number of oval beads.

$$\begin{aligned}y &\leq 6x & y &\geq 3x \\y &\leq -\frac{2}{3}x + 24 & y &\geq -\frac{2}{3}x + 20\end{aligned}$$

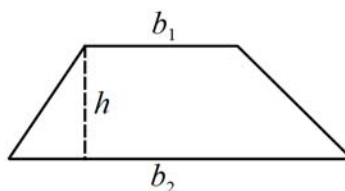
- B.** Graph:



- C.** 3 animals and 18 ovals

**HSA-CED.A.4** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law  $V = IR$  to highlight resistance  $R$ .*

1. The area of a trapezoid is  $A = \frac{1}{2}h(b_1 + b_2)$ . What is the value of  $b_1$  in terms of the other quantities represented?



**Answer:**  $b_1 = \frac{2A}{h} - b_2$

## CED Creating Equations in Expressions Cluster

2. The volume of a large can of soup can be calculated using the formula  $V = \pi r^2 h$ . Write an equation to find the radius,  $r$ , in terms of  $V$  and  $h$ .

**Answer:**  $r = \sqrt{\frac{V}{\pi h}}$  or  $r = \frac{\sqrt{V\pi h}}{\pi h}$

---

3. Rewrite in slope-intercept form by solving for  $y$ :  $4x - 29 + 5y + 6x = 1$

**Answer:**  $y = -2x + 6$

---

4. Chelsea was asked to solve the formula  $s = ut + \frac{1}{2}at^2$  for  $a$ . She has this solution so far:

$$s = ut + \frac{1}{2}at^2$$

Step 1:  $s - ut = \frac{1}{2}at^2$

Step 2:  $2(s - ut) = at^2$

Chelsea texted her friend to ask for help and her friend replied that the answer is  $= \frac{2s-2ut}{t^2}$ . Help Chelsea finish her work by continuing the work that she has so far.

**Answer:** Step 3:  $2s - 2ut = at^2$   
Step 4:  $a = \frac{2s-2ut}{t^2}$

---

5. The formula for the volume of a sphere is  $V = \frac{4}{3}\pi r^3$ , where  $r$  is the radius of the sphere. Rewrite the equation so that  $r$  is a function of the volume.

**Answer:**  $\sqrt[3]{\frac{3V}{4\pi}} = r$

---

### ***CED Creating Equations in Expressions Cluster***

6. The formula to determine projectile motion is  $h = -16t^2 + vt + h_1$ , where  $t$  equals time and  $v$  equals the initial velocity, and  $h_1$  equals the initial height. Write the equivalent equation in terms of  $v$ .

**Answer:**       $h - h_1 = -16t^2 + vt$        $h - h_1 + 16t^2 = vt$

$$\frac{h - h_1 + 16t^2}{t} = v$$

---