High School / Unscored Student Samples ITEM #3

MATH ANNOTATIONS * SMARTER BALANCED PERFORMANCE TASK

Focus Standards and Claim

Claim 2

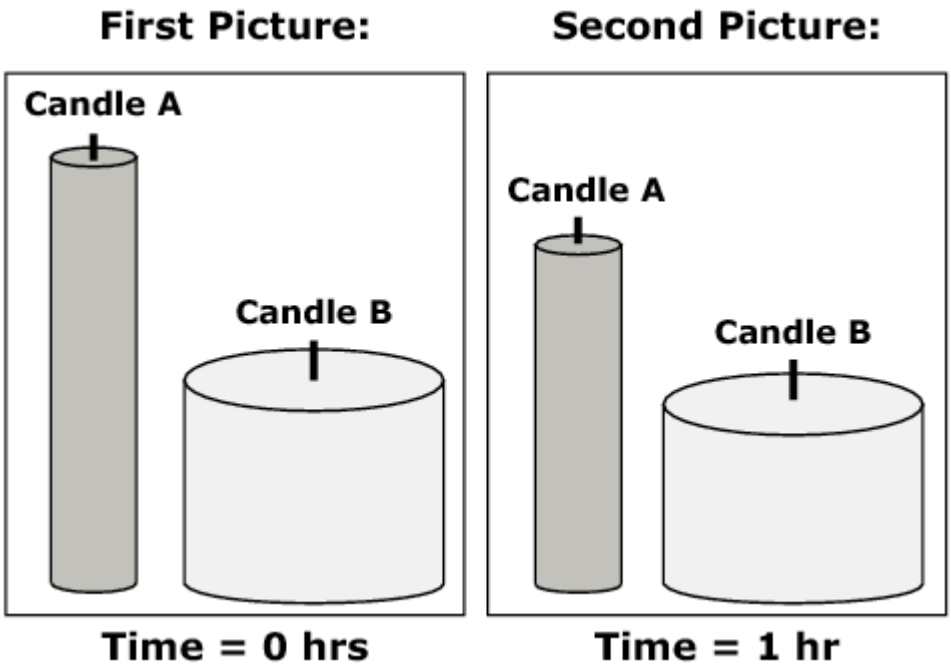
8.EE.C.8

Stimulus

Lights, Candles, Action!

Your friend Abbie is making a movie. She is filming a fancy dinner scene and she has two types of candles on the table. She wants to determine how long the candles will last.

She takes a picture, lights the candles, and then lets them burn for 1 hour. She then takes a second picture. You can assume that each candle burns at its own constant rate.



Candle Type A initial height = 20 cm

Candle Type B initial height = 10 cm

Candle Type A height after burning for 1 hour = 16 cm

Candle Type B height after burning for 1 hour = 9 cm

You will use this information to help Abbie think about the candles she might use for her film.

Item Prompt

Abbie has 3 hours left to film. She lights a new Candle Type A and Candle Type B and then starts filming.

In the 3 hours she has left, will Abbie capture the moment when the candles are exactly the same height?

Explain to Abbie how you can determine the answer.

Sample Responses

Sample Response A

Abbie can determine her answer by remodifying the equations I used.

H = total height of the candle

Oa = Original Height of Candle Type A

Ob = Original Height of Candle Type B

t = hours spent burning

n = difference of height lost in 1 hour of burning

n1 = Candle A

n2 = Candle B

H = Oa – n1t

H = Ob – n2t

By using these equations, Abbie can determine if Candle Type A and Candle Type B will be the exact same height by determining the candles' height after a # of hours burning.

Sample Response B

Yes it is possible, because since candle A loses 4cm in 1 hour and Candle B only loses 1cm in 1 hour then around the third hour they should be the same height. She would have to subtract 4cm from the height of candle A and subtract 1cm from the height of candle B until they reach the same height, but she can only subtract them 3 times or else she'll exceed her 3 hour goal.

Sample Response C

X = hours

A(h) = 20 – 4x

B(h) = 10 – x

20 – 4x = 10-x

10 = 3x

X = 10/3 hour

X = 3 1/3

No Abbey will not be able to capture the moment where the candles are the same height because equations that represent the decreasing height can be constructed for A and B. When those equations are set equal to each other, it represents when at what time the height of candles are equal. Solving that equation, x is found equal to 3 1/3 hour which is past 3 hours. Also a table with the height of both A and B can be constructed.

Hour	1	2	3
Candle A	16	12	8
Candle B	9	8	7

Sample Response D

Type A = 5 hours

Type B = 10 hours

Type B 7-3 = 4cm

Type A after 3hr = 8cm

No, Abbie will not capture the moment when the candles are exactly the same because after she burns 3 hrs before she only have 7cm left. Then after she burns another 3 hrs she will only have 4cm left. With Candle Type A after burning 3 hrs it will go down to 8cm because every hour it will burns off 4cm. So the height of both Type A & B are different by 2 times.

Sample Response E	X = # of hours X = final height (cm) -4x + 20 = -x + 10 10 = 3x 10/3 = x You first create two equations, one for Candle A and one for Candle B. You then make them equal to each other, therefore making you solve for x. After finding x, you will find out that it will take around 3.3 hours to capture the moment when the candles are the same height. But with the time constraint of 3 hours, she won't be able to see the moment.
Sample Response F	Yes, maybe. Because candle A burns faster than candle b, candle A is just 1cm off of candle B, so at a point in the 3 hours, they will have the same height.
Sample Response G	In three hours, she will see the candles be about the same height. Since type A starts out at 20cm & type B starts out at 10cm, in three hours, type A would go down 12cm and type B would go out 3cm. It would be 8cm for A & 7cm for B.
Sample Response H	According to the given evidence, candle A & B will both burn out before the new set of candles can match because the constant rate will make them decrease over time and the old candles have had more time to burn so they will run out quicker than the new ones.

Sample Response I

1 hour:

$20 - 4 = 16$

$10 - 1 = 9$

2 hours:

$16 - 4 = 12$

$9 - 1 = 8$

3 hours:

$12 - 4 = 8$

$8 - 1 = 7$

No, the candles won't be exactly the same height. Candle type A will be 8 cm while candle type B will be 7cm. Take the initial height subtract 4 cm (candle type A) or 1 cm (candle type B) for each hour that passes.