

Focus  
Standards  
and Claim

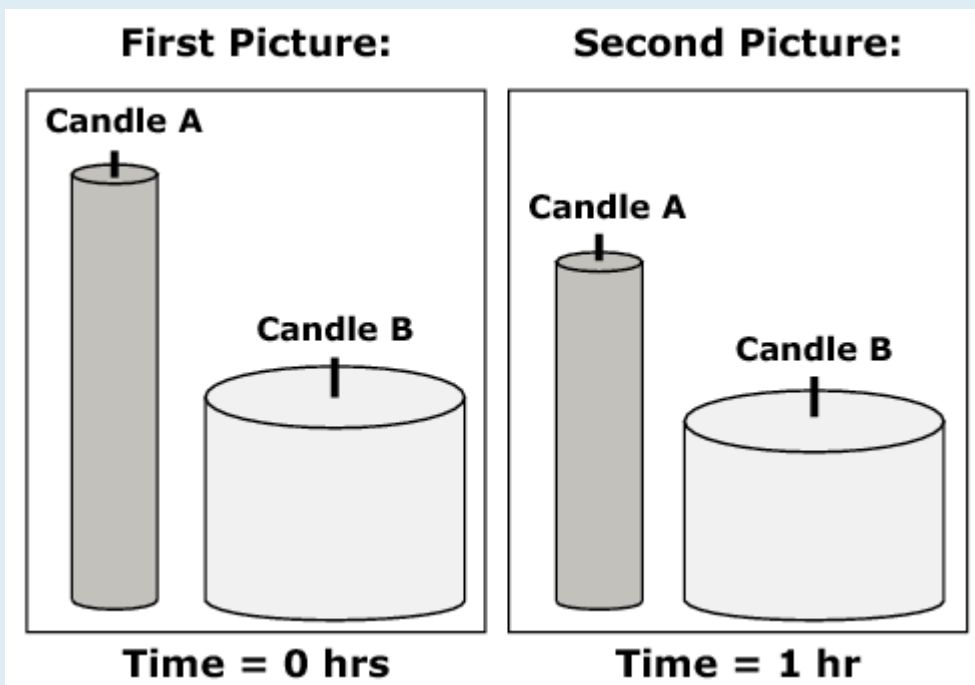
Claim 4  
FLE.B.5

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

For her next film, Abbie wants candles that will burn for exactly 8 hours. You want to give her a choice by designing two different candles (Type C and Type D).

Using the equation  $h = k + nt$ , determine two different pairs of values for  $k$  and  $n$  that will meet the requirement to burn down to a height of 0 cm in exactly 8 hours.

Complete the table to show two possible sets of values for  $k$  and  $n$  for your new candle designs.

	$k$	$n$
<b>Candle Type C</b>		
<b>Candle Type D</b>		

Scoring Guide

SCORE	2 POINTS	1 POINT	0 POINTS
	The student creates values for $k$ and $n$ that result in Candle Type C and Candle Type D burning out in 8 hours.	The student creates values for $k$ and $n$ that result in Candle Type C or Candle Type D burning out in 8 hours.	All other responses.

Sample Responses

Student Sample A



	$k$	$n$
<b>Candle Type C</b>	<b>24</b>	<b>-3</b>
<b>Candle Type D</b>	<b>16</b>	<b>-2</b>

SCORE RATIONALE

The student identified values for  $k$  and  $n$  that result in Candle Type C and Candle Type D burning out in exactly 8 hours.

Student Sample B



	k	n
Candle Type C	8	-1
Candle Type D	16	-2

**SCORE RATIONALE**

The student identified values for k and n that result in Candle Type C and Candle Type D burning out in exactly 8 hours.

Student Sample C



	k	n
Candle Type C	8	-1
Candle Type D	10	-1.25

**SCORE RATIONALE**

The student identified values for k and n that result in Candle Type C and Candle Type D burning out in exactly 8 hours. Even though the units given for n are incorrect (should be cm/hour), the problem requires correct numerical values only, so this response earns full credit.

Student Sample D



	k	n
Candle Type C	8	-1
Candle Type D	8	1

**SCORE RATIONALE**

The student provided appropriate values of k and n for Candle Type C only. This response earns partial credit of 1 point.

Student Sample E



	k	n
Candle Type C	40	5
Candle Type D	8	-1

**SCORE RATIONALE**

The student provided appropriate values of k and n for Candle Type D only. This response earns partial credit of 1 point.

## Student Sample F



	k	n
Candle Type C	-9	1
Candle Type D	-16	2

**SCORE RATIONALE**

The student provided values for k and n that are not reasonable in this situation for either candle. This response earns 0 points.

## Student Sample G



	k	n
Candle Type C	2	1
Candle Type D	4	.5

**SCORE RATIONALE**

The student provided values for k and n that would work for Candle Type D if the equation were  $h = k - nt$ , instead of the given equation,  $h = k + nt$ . Because neither set of values fits the given requirements, this response earns 0 points.

## Student Sample H



	k	n
Candle Type C	2	16
Candle Type D	4	32

**SCORE RATIONALE**

The student provided values for k and n that do not fit the requirements for either candle. The student likely switched the meanings of k and n, and also did not consider the need for negative values for the burn rate. This response earns 0 points.

## Student Sample I



	k	n
Candle Type C	24	3
Candle Type D	40	5

**SCORE RATIONALE**

The student provided values for k and n that would work for both candles if the equation was  $h = k - nt$  instead of the given equation,  $h = k + nt$ . Because neither set of values fits the given requirements, this response earns 0 points.