

Apply understanding of exponents as repeated multiplication to develop and create equivalent expressions and justify the laws of multiplication and division (without names). CCSS.MATH.CONTENT.8.EE.A.1 | US\_EN\_08\_MAT\_C1\_WS\_m1

You have seen how crucial math was for XLabs to solve the Binate problem. Let's help XLabs manage another superbug DelCAT by understanding its behavior using exponents and powers.

1

A testing kit to detect superbug DelCAT costs \$11. You buy  $n$  number of testing kits. The packaging charge costs an additional \$12. How much money do you pay in total? Write your answer in the boxes given below.

Total money paid = \$    $n$  

2

You can open the safe box guarding the DelCAT samples only if you match the correct statements in the following:

$a^m \times a^n = a^{m \cdot n}$  ●

●  $a^{m - n}$

$a^m \div a^n = a^{m \cdot n}$  ●

●  $a^{m \times n}$

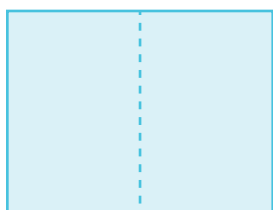

$(a^m)^n = a^{m \cdot n}$  ●

●  $a^{m + n}$

3

DelCAT samples are stored in a box of area  $2^5$  sq units, which is divided into 2 equal compartments. Find the area of the smaller compartments. Write your answer in the boxes given below.

Area of smaller compartments =  $2^5 \div$

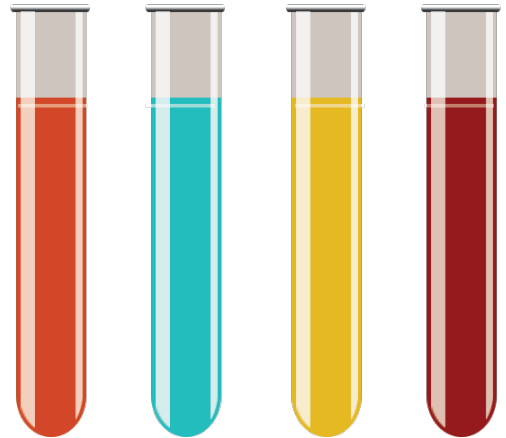
 =      =

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**4**

Find the codes to start running the tests on the DelCAT superbug using the provided clues. Write your answers in the boxes given below.

Clues	Codes
$x^3 \times x^6$	$x^9$
$12^{20} \div 12^6$	12 <input type="text"/> <input type="text"/>
$(z^3)^5$	z <input type="text"/> <input type="text"/>



**5**

Evaluate the following expressions to predict the growth pattern of 3 samples of DelCAT. Write your answers in the boxes given below.

**Hint:** Use PEMDAS.

Sample 1:

$$(14 - 7) \times (7^2)^2 \div 7 = 7$$

Sample 2:

$$(25 - 20) \times 5^3 =$$

Sample 3:

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

Sample 4:

$$2^6 \div 4^3 =$$

**6**

DelCAT doubles its count every one hour. The count after  $t$  hours is  $N$ . The initial count of DelCAT is  $10^4$ . Check ☒ the correct box.

**Hint:** 2 is multiplied by itself ' $t$ ' times.

☐

$$N = 10^4 + 2^t$$

☐

$$N = 10^4 \times 2^t$$

☐

$$N = 10^4 \times 12$$

☐

$$N = 10^4 \div 2^t$$

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**XLabs wants to market its grand success in combating the DelCAT superbug using social media.**

1

The social media post about the new vaccine was reshared  $x$  times on the first day. On the second day, it had twice the reshares it had on the first day plus 16 more reshares by government agencies. Circle the expression that correctly represents the number of retweets on the second day.

$5x + 10$

$16 + 2x$

$16x + 2$

$2x^{16}$

2

XLabs' social media is getting  $10^3$  new subscribers everyday. How many subscribers will it have in  $10^2$  days? Check ☒ the correct box.

☐  $10^6$

☐  $10^5$

☐  $10(6)$

☐  $5^{10}$



3

The social media team at XLabs has found that the post about DelCAT has 81 times more views than the post about Binates. The post about DelCAT is viewed  $3^{11}$  times. Find the number of times the Binates post is viewed. Write your answer in the boxes given below.

**Hint:** Write 81 as a product of prime factors and then represent it as an exponent.

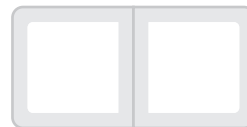
**Step 1:** Views of DelCAT post  
= 81 times the views  
of Binates post

= 3



times the views of Binates post

3

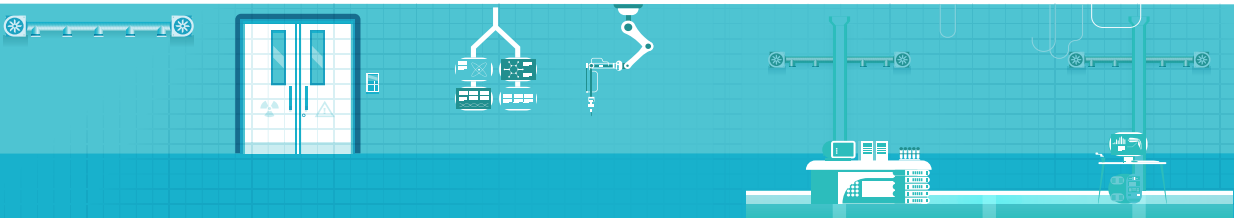


= 3

× Views for  
Binates post.

**Step 2:** Views for Binates post

=



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**4**

The post on the new vaccine got  $2^4 \times 3 \times 5^3$  likes per second. There are  $2^8 \times 3^4 \times 5^2$  seconds in 6 days. Find the number of likes during this period. Write your answer in the boxes given below.

Total no. of likes in 6 days = No. of likes per second  $\times$  No. of seconds in 6 days

Total no. of likes in 6 days = 2    $\times$  3   $\times$  5  likes

**5**

The social media team at XLabs created  $2^n$  videos this month.  $n$  is the number of video editors in the team. The creation of each video costs \$8. If the total cost of creating the videos is \$64, how many video editors do they have? Write your answer in the boxes given below.

**Step 1:**

Write 64 as a product of prime factors.

64 =   $\times$    $\times$    $\times$    $\times$    $\times$

**Step 2:**

Write 8 as a product of prime factors.

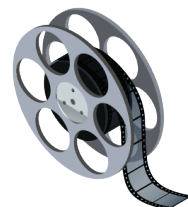
8 =   $\times$    $\times$



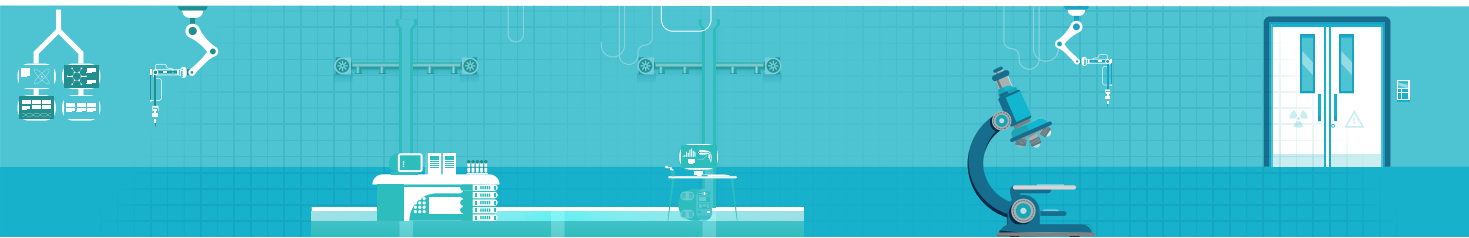
**Step 3:**

Total cost of the videos = Total no. videos created  $\times$  Cost of each video

=  $2^n \times$



Number of video editors ( $n$ ) =



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**XLab's new vaccine against the DelCAT superbug, called DelPLUS, is in very high demand. Create a production plan to produce and ship the vaccine.**

**1** Choose the number of vaccines you want to produce each week based on the guidelines given below.

Guidelines:

- The company has the ability to manufacture between  $3^{10}$  to  $3^{20}$  vaccines per week.
- The company can produce more vaccines in Week 2 than in Week 1.
- Write your answers in the boxes given below.

No. of vaccines produced per week	
Week 1	Week 2
<div style="display: flex; align-items: center;"> <span style="margin-right: 5px;">3</span> <div style="border: 1px solid gray; padding: 5px; display: inline-block;"> <div style="border: 1px solid gray; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> </div> </div> </div>	<div style="display: flex; align-items: center;"> <span style="margin-right: 5px;">3</span> <div style="border: 1px solid gray; padding: 5px; display: inline-block;"> <div style="border: 1px solid gray; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> </div> </div> </div>



**2** The cost of producing each vial of vaccine is \$27. Calculate the production cost for each week. Write your answers in the boxes given in the table below.

Step 1: Write 27 as a product of prime factors.  $27 =$

××= 3

Step 2: Production cost per week = No. of vaccines needed per week × Cost per vaccine

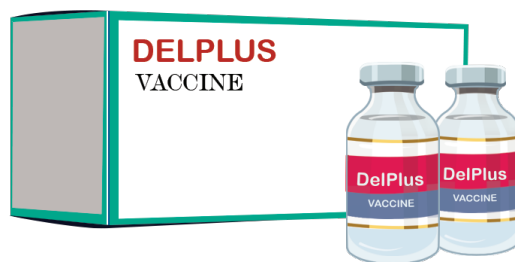
Week 1	Week 2
<div style="display: flex; align-items: center; gap: 10px;"> <span style="margin-right: 5px;">3</span> <div style="border: 1px solid gray; padding: 5px; display: inline-block;"> <div style="border: 1px solid gray; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> </div> </div> <span>×</span> <div style="border: 1px solid gray; padding: 5px; display: inline-block;"> <div style="border: 1px solid gray; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> </div> </div> </div> <div style="margin-left: 10px;"> <div style="border: 1px solid gray; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> </div> </div>	<div style="display: flex; align-items: center; gap: 10px;"> <span style="margin-right: 5px;">3</span> <div style="border: 1px solid gray; padding: 5px; display: inline-block;"> <div style="border: 1px solid gray; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> </div> </div> <span>×</span> <div style="border: 1px solid gray; padding: 5px; display: inline-block;"> <div style="border: 1px solid gray; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> </div> </div> </div> <div style="margin-left: 10px;"> <div style="border: 1px solid gray; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> <div style="border: 1px solid gray; width: 20px; height: 20px; margin: 2px;"></div> </div> </div>
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**3**

Choose the number of vaccines you want to pack in a box. Each box can hold between  $3^3$  to  $3^8$  vials of vaccine. Write your answer in the box given below.

Number of vaccines per box = 3



**4**

Calculate the number of boxes needed per week. Write your answers in the boxes given in the table below.

$$\text{No. boxes needed per week} = \frac{\text{No. of vaccines produced per week}}{\text{No. of vaccines per box}}$$

No. of boxes needed	
Week 1	Week 2
$3 \times \boxed{\phantom{00}} \times \boxed{\phantom{00}} \div 3 \times \boxed{\phantom{00}}$	$3 \times \boxed{\phantom{00}} \times \boxed{\phantom{00}} \div 3 \times \boxed{\phantom{00}}$
$= 3 \times \boxed{\phantom{00}} \times \boxed{\phantom{00}}$	$= 3 \times \boxed{\phantom{00}} \times \boxed{\phantom{00}}$



Congratulations! Your production plan has been approved. We can now save many people from the DelCAT superbug with the help of DelPLUS.

