Mathematics

Numbers: Applications of Factors and Multiples

Science and Mathematics Education Research Group

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Applications of Factors and Multiples

FACTORS

and

MULTIPLES

Bring on the challenge!

Retrieved from http://www.slideshare.net/Haryyanny/factors-and-multiples-challenge

Applications of Factors and Multiples I

A frog can move 2 m per jump, and a kangaroo can move 5 m per jump. If they both move together from the start, where will their next common landing point be?

A. $5\,m$

B. $10\,m$

C. $12\,m$

D. $14\,m$

E. $15\,m$

Solution

Answer: B

Justification: This problem wants you to find the next common landing distance between 2 m and 5 m. Thus, we want to find the least common multiple between 2 m and 5 m.

For multiples of 2, we are multiplying 2 starting with 1, 2, 3, etc. Thus, multiples of 2 are

$$2 \times 1, 2 \times 2, 2 \times 3, 2 \times 4, 2 \times 5, \ldots$$
2 4 6 8 10 …

Similarly, multiples of 5 are:

$$5 \times 1, 5 \times 2, 5 \times 3, 5 \times 4, 5 \times 5, \ldots$$
5 10 15 20 25 …

Thus, our answer is B.

Applications of Factors and Multiples II

We want to cut a piece of paper with a base of 18 cm, and a height of 27 cm into identical squares with the largest possible dimensions. How many squares can we make without having any remaining paper?

A. 3

B. 4

C. 6

D. 12

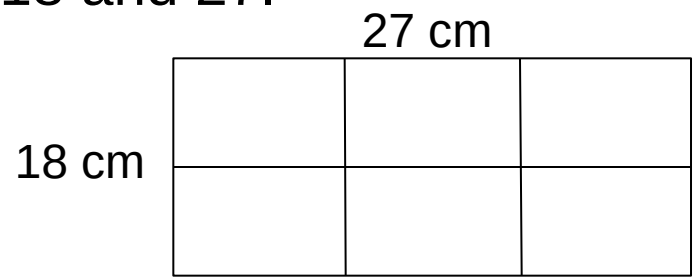
E. 54

Solution

Answer: C

Justification: Since we are dealing with squares, they have to have equal sides. These sides must be the largest possible that we can get (without a remainder) from the 18 by 27 cm piece of paper. Thus, the sides of the square will be the greatest common factor (GCF) between 18 and 27.

	18	27
3	6	9
3	2	3



Once we can no longer divide by the same prime number, we can stop. In order to find the GCF, we have to multiply the numbers we have been dividing both 18 and 27 by (the numbers in red circles). By multiplying 3 x 3, we get 9. Thus, our GCF is 9cm. Then, we can get 6 squares ((18cm÷9cm) x (27cm÷9cm)). The answer is C.

Applications of Factors and Multiples III

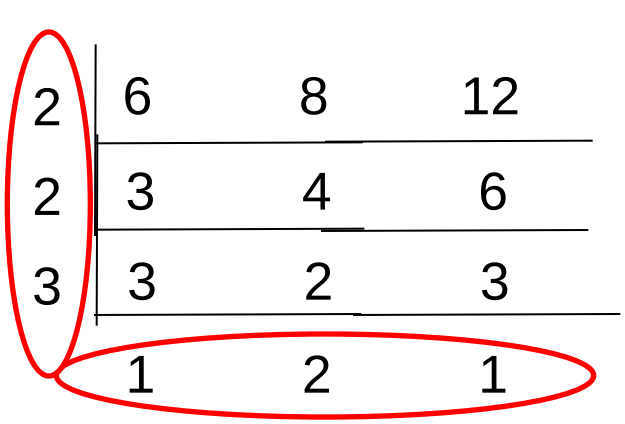
Building A is cleaned every 6 days. Building B is cleaned every 8 days. Building C is cleaned every 12 days. If a cleaner cleaned all three buildings on the 1st day of November, when is the next day that all buildings will be cleaned?

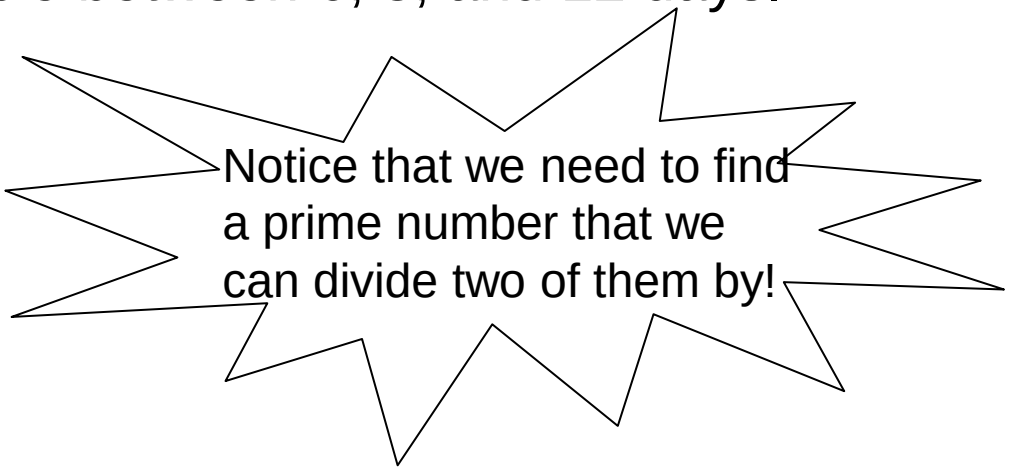
A. *November* 7th
B. *November* 9th
C. *November* 13th
D. *November* 25th
E. *December* 1st

Solution

Answer: D

Justification: This problem requires us to find the next common date between 6, 8, and 12 days. Thus, we want to find the least common multiple between 6, 8, and 12 days.





After the operation, we can start multiplying numbers in the red circle. Then, we get 24 days. Thus, November 1st + 24 days = November 25th. The answer is D.

Applications of Factors and Multiples IV

If we divide both 14 and 17 with some number, their remainder is 2. Find this number.

A. 2
B. 3
C. 5
D. 6
E. 7

Solution

Answer: B

Justification: This problem can be done using the following procedure.

1.If the remainder is 2, the divisor must be bigger than 2. Thus, A **cannot** be our answer.

2.14 is divisible by 7. Thus, E **cannot** be our answer.

3.Take away 2 (the remainder) from both 14 and 17. The reason we do this is to find the numbers that we get from 14 and 17 that when divided give no remainder. We get 12 and 15.

4.We want to find a number that can divide both 12 and 15 without having any remainder. From our remaining answer, we can divide both 12 and 15 by 3. Thus, our answer is B.

Applications of Factors and Multiples V

Jim checks his Facebook every 5 minutes. Tim checks his Facebook every 7 minutes. Kim checks her Facebook every 9 minutes. If they all checked Facebook at 1:00 pm, when is the next time that they check their Facebook at the same time?

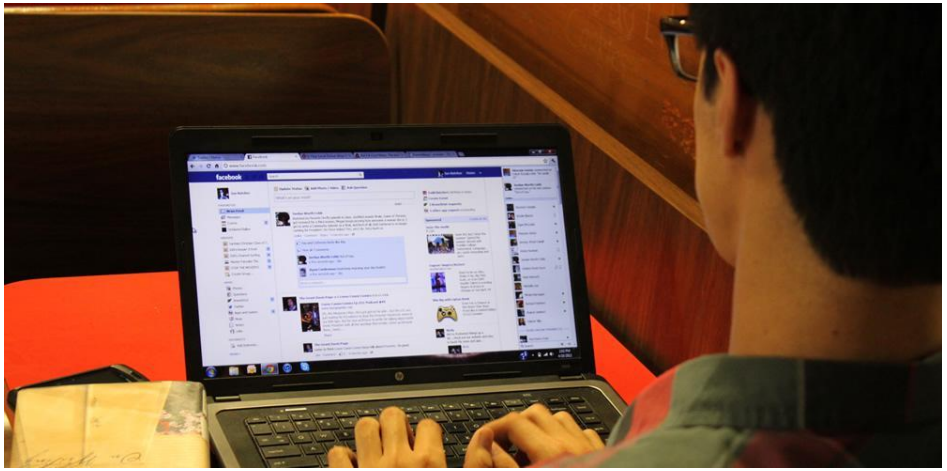
A. $1:45\ pm$

B. $2:00\ pm$

C. $4:15\ pm$

D. $6:15\ pm$

E. $6:25\ pm$

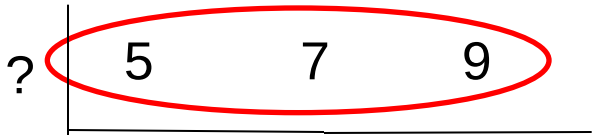


Retrieved from http://tasithoughts.com/2014/01/02/facebook-and-social-media-more-connection-then-disconnection/

Solution

Answer: D

Justification: This problem wants you to find the next common time between 5, 7, and 9 minutes. Thus, we want to find the least common multiple between 5, 7, and 9 minutes.



Unfortunately, we don't have a prime number to divide all 5, 7, and 9 by. In this case, we can just multiply them all together, and that number will be our LCM. Thus, our LCM is 5 x 7 x 9 = 315 minutes. In hours, 315 minutes (300 + 15 minutes) is converted into 5 hours and 15 minutes. Then, adding 5 hours and 15 minutes to 1:00 pm gives us 6:15 pm. Our answer is D.

Applications of Factors and Multiples VI

A bakery wants to make fruit pies for their Christmas special product . Suppose they want to make some samples out of 48 blueberries, 24 raspberries, and 36 slices of kiwi, and they want to use all the fruit. How many sample pies can we create so that we have the same amount of each type of fruit in each pie?

A. 4

B. 8

C. 12

D. 24

E. 48

Solution

Answer: C

Justification: For the number of pies, we want the largest possible number of pies. Thus, the number of pies will be the GCF between 48, 24, and 36.

2	48	24	36
2	24	12	18
3	12	6	9
	4	2	3

Once we can no longer divide by the same prime number, we can stop. In order to find the GCF, we have to multiply the numbers we have been dividing both 18 and 27 by (the numbers in red circles). Thus, we get 2 x 2 x 3 = 12 pies. Our answer is C.

Retrieved from http://www.tablespoon.com/recipes/individual-fruit-pies/432ae19a-39b3-415b-baca-0066377167ab

Applications of Factors and Multiples VII

Suppose there are two gears. The first gear has 12 teeth and the other has 32 teeth. In the diagram, two gears are aligned by the intersection of the centre of the first gear and the centre of the second gear. How many times should the first gear rotate to realign at the original centre?

A. 3

B. 8

C. 12

D. 32

E. 96

Retrieved from http://www.ravensroads.com/xv1000-virago-front-head-timing/

Solution

Answer: B

Justification: For one rotation the first gear takes 12 teeth, whereas the second gear takes 32 teeth. To find the number of rotations of the first gear to go back to original centre, we must find the least common multiple of teeth between the two gears.

2	12	32
2	6	16
	3	8

Once we can no longer divide by same prime number, we can stop. In order to find the LCM, we have to multiply all the numbers in red circles. Thus, we get 2 x 2 x 3 x 8 = 96 teeth. Dividing 96 teeth ÷ 12 teeth = 8 rotation. Our answer is B.

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