

Prime factorization Warm Up

Feb.27, 2019

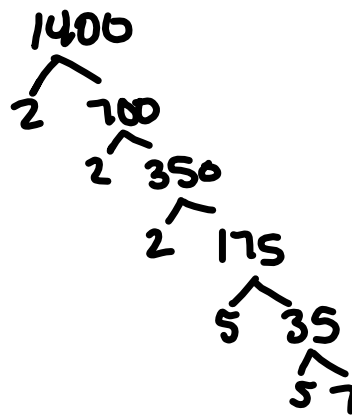
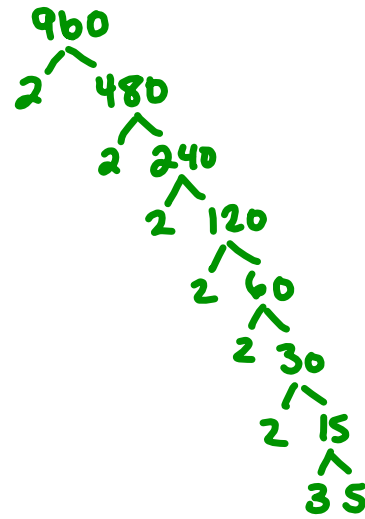
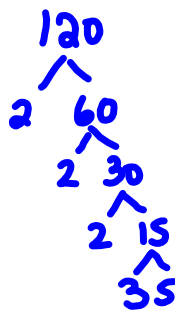
Find the GCF (120, 960, 1400)

$$120 = \underline{2} \times \underline{2} \times \underline{2} \times \underline{3} \times \underline{5}$$

$$960 = \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} \times \underline{3} \times \underline{5}$$

$$1400 = \underline{2} \times \underline{2} \times \underline{2} \times \underline{5} \times \underline{5} \times \underline{7}$$

$$\text{GCF} = 2 \times 2 \times 2 \times 5 \\ = 40$$



Find the LCM (15, 20, 24, 27)



$$15 = 3 \times 5$$

$$20 = 2 \times 2 \times 5$$

$$24 = 2 \times 2 \times 2 \times 3$$

$$27 = 3 \times 3 \times 3$$

$$\begin{aligned} \text{LCM}(15, 20, 24, 27) &= 2^3 \times 3^3 \times 5^1 \\ &= 8 \times 27 \times 5 \\ &= 1080 \end{aligned}$$

Old method

Warm Up

Feb.27, 2019

Find the GCF (120, 960, 1400)

120
 1 x 120
 2 x 60
 3 x 40
 5 x 24
 6 x 20
 8 x 15
 10 x 12

960
 1 x 960
 2 x 480
 3 x 320
 4 x 240
 5 x 192
 6 x 160
 8 x 120
 10 x 96
 12 x 80
 15 x 64
 16 x 60
 20 x 48
 24 x 40
 30 x 32

1400
 1 x 1400
 2 x 700
 4 x 350
 5 x 180
 7 x 200
 8 x 175
 10 x 140
 14 x 100
 20 x 70
 25 x 56
 28 x 50
 35 x 40

Find the LCM (15, 20, 24, 27)

15 → 15, 30, 45, 60, 75, 90, 105, 120, 135, 150, 165, 180, 195, 210, 225, 240

20 → 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 320, 340

24

Worksheet

1)) Find the

- a) GCF (24, 40) b) GCF (84, 60) c) GCF (36, 90, 126)

1)) Find the

- a) LCM (15,40) b) LCM (12,15) c) LCM (9, 14, 63)

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Factor Worksheet

GCF \Rightarrow Circle ^{all} common primes (even repeats) (multiple)

LCM \Rightarrow List prime & used then take the maximum exponent used (multiple)

1) GCF(24, 40)

24

```

      24
     /  \
    12   2
   /  \  /  \
  6   2 2   2
 /  \  /  \
3   2 2   2

```

$24 = \underbrace{2 \times 2 \times 2}_{2^3} \times 3$

40

```

      40
     /  \
    20   2
   /  \  /  \
  10  2 2   2
 /  \  /  \
5   2 2   2

```

$40 = \underbrace{2 \times 2 \times 2 \times 2}_{2^4} \times 5$

\rightarrow Look at common amount of primes must appear in both

GCF(24, 40) = $2 \times 2 \times 2$
 $= 2^3 \leftarrow$ appears in both
 $= 8$

LCM(24, 40) = $2^4 \times 3 \times 5$
 $= \underbrace{16}_{\text{primes seen}} \times 3 \times 5$
 $= 240$

2) GCF(84, 60)

84

```

      84
     /  \
    42   2
   /  \  /  \
  21  2 2   2
 /  \  /  \
3   7 2   2

```

$84 \Rightarrow \underline{2} \times \underline{2} \times \underline{3} \times 7$

60

```

      60
     /  \
    30   2
   /  \  /  \
  15  2 2   2
 /  \  /  \
3   5 2   2

```

$60 \Rightarrow \underline{2} \times \underline{2} \times \underline{3} \times 5$

GCF(84, 60) = $2 \times 2 \times 3$
 $= \underbrace{4}_{\text{primes seen}} \times 3$
 $= 12$

LCM(84, 60) = $2^2 \times 3 \times 5 \times 7$
 $= \underbrace{4}_{\text{primes seen}} \times 3 \times 5 \times 7$
 $= 12 \times 5 \times 7$
 $= 420$

c) GCF (36, 90, 126)

$$\begin{array}{c} 36 \\ \swarrow \searrow \\ 2 \quad 18 \\ \swarrow \searrow \\ 2 \quad 9 \\ \swarrow \searrow \\ 3 \quad 3 \end{array}$$

$$36 = 2 \times 2 \times 3 \times 3$$

$$= 2^2 \times 3^2$$

$$\begin{array}{c} 90 \\ \swarrow \searrow \\ 2 \quad 45 \\ \swarrow \searrow \\ 5 \quad 9 \\ \swarrow \searrow \\ 3 \quad 3 \end{array}$$

$$90 = 2 \times 3 \times 3 \times 5$$

$$= 2^1 \times 3^2 \times 5^1$$

$$\begin{array}{c} 126 \\ \swarrow \searrow \\ 2 \quad 63 \\ \swarrow \searrow \\ 3 \quad 21 \\ \swarrow \searrow \\ 3 \quad 7 \end{array}$$

$$126 = 2 \times 3 \times 3 \times 7$$

$$= 2^1 \times 3^2 \times 7^1$$

$$\text{GCF}(36, 90, 126) = 2 \times 3^2$$

$$= 2 \times 9$$

$$= 18$$

$$\text{LCM}(36, 90, 126)$$

$$= 2^2 \times 3^2 \times 5^1 \times 7^1$$

$$= 2 \times 9 \times 5 \times 7$$

$$= 630$$

d) LCM (15, 40)

$$\begin{array}{c} 15 \\ \swarrow \searrow \\ 3 \quad 5 \end{array}$$

$$15 = 3 \times 5$$

$$\begin{array}{c} 40 \\ \swarrow \searrow \\ 2 \quad 20 \\ \swarrow \searrow \\ 2 \quad 10 \\ \swarrow \searrow \\ 2 \quad 5 \end{array}$$

$$40 = 2 \times 2 \times 2 \times 5$$

$$= 2^3 \times 5$$

$$\text{LCM}(15, 40) = 2^3 \times 3^1 \times 5^1$$

$$= 8 \times 3 \times 5$$

$$= 120$$

$$\text{GCF}(15, 40) = 5$$

$$2^3 \times 3^1 \times 5^1$$

$$8 \times 3 \times 5$$

$$120$$

2) b) LCM (12, 15)

$$\begin{array}{c} 12 \\ \swarrow \downarrow \\ 2 \quad 2 \quad 3 \\ \wedge \\ 2 \quad 3 \end{array}$$

$$\begin{array}{c} 15 \\ \wedge \\ 3 \quad 5 \end{array}$$

$$12 = 2 \times 2 \times 3 \\ = 2^2 \times 3$$

$$15 = 3 \times 5$$

$$\begin{aligned} \text{LCM}(12, 15) &= 2^2 \times 3^1 \times 5^1 \\ &= 4 \times 3 \times 5 \\ &= 60 \end{aligned}$$

$$\text{GCF}(12, 15) = 3$$

$$\begin{aligned} &2^2 \quad 3^1 \quad 5^1 \\ &4 \times 3 \times 5 \\ &60 \end{aligned}$$

c) LCM(9, 14, 63)

$$\begin{array}{c} 9 \\ \swarrow \downarrow \\ 3 \quad 3 \end{array}$$

$$\begin{array}{c} 14 \\ \wedge \\ 2 \quad 7 \end{array}$$

$$\begin{array}{c} 63 \\ \swarrow \downarrow \\ 3 \quad 3 \quad 7 \\ \wedge \\ 3 \quad 7 \end{array}$$

$$9 = 3 \times 3 \\ = 3^2$$

$$14 = 2 \times 7$$

$$63 = 3 \times 3 \times 7 \\ = 3^2 \times 7$$

$$\begin{aligned} \text{LCM}(9, 14, 63) &= 2^1 \times 3^2 \times 7^1 \\ &= 2 \times 9 \times 7 \\ &= 126 \end{aligned}$$

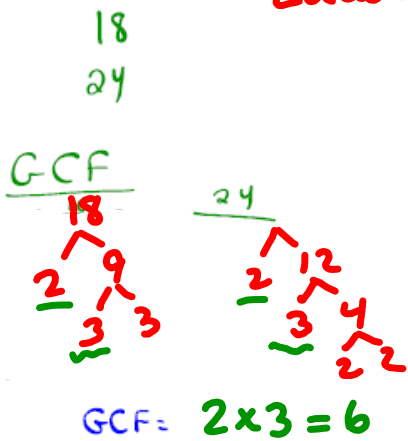
$$\text{GCF}(9, 14, 63) = \text{None}$$

$$\begin{aligned} &2^1 \times 3^2 \times 7^1 \\ &= 2 \times 9 \times 7 \\ &126 \end{aligned}$$

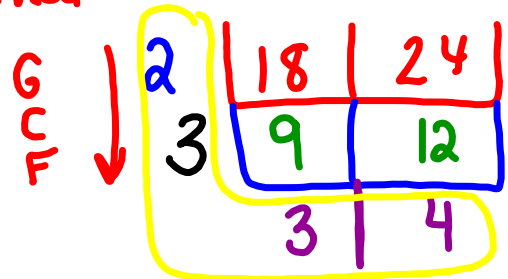
Video On GCF & LCM

<https://www.youtube.com/watch?v=NFHEH2rzSJo>


Ladder / Box Method



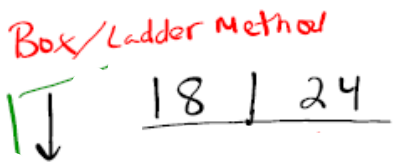
LCM
18 →
24 →



LCM

$$2^3 \times 3^2 = 8 \times 9 = 72$$

$$LCM(18, 24) = 2 \times 3 \times 3 \times 4 = 72$$



GCF = $2 \times 3 = 6$

Homework

Exercises page 140

A

3

a, b, c

4

5

a, b, c

B

a, c, e

6

7

~~8~~

6b

8

a, c

9

a, c, e

10

11

12

13

14

15

a, d

16

a, d

17

18

20

C

21

22