1.5 Greatest Common Factor

Essential Question: How can you find the Greatest Common Factor of 2 numbers?

List all the factors of the following numbers.

$6 \rightarrow 1,6 \quad 2,3$
$12 \rightarrow 1,12 \quad 3,4 \quad 2,6$

The numbers 6 and 12 have common factors of 1,2,3,6. the GCF is 6.

Common Factors -> Factors that are shared by two or more numbers.

Greatest Common Factor (GCF-> The biggest factor that is shared by 2 or more numbers.

One way to find the GCF of two or more numbers is by listing factors.

EXAMPLE 1

Find the GCF of 24 and 40 by listing factors.

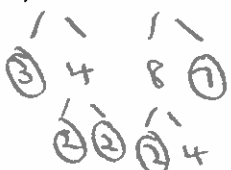Factors of 24 $\rightarrow$ 1,24 2,12 ⑧3 6,4   GCF is 8

Factors of 40 $\rightarrow$ 1,40 ⑧5 2,20 4,10

Another way to find the GCF of two or more numbers is by using prime factorization
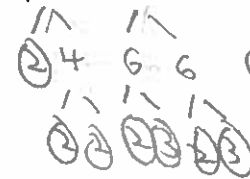
EXAMPLE 2

Find the GCF using prime factorization.

1) 12 and 56

③ 4   8 ⑦
②② ②4
$12 = ②,②,3$
$56 = ②②2.7 \leftarrow$ Circle the common prime factors

2) 8 and 36

②4 6 6   GCF=2·2=4
②② ②② ②③
$8 = ②②2$
$36 = ②②.3.3$

3) 18 and 72

②9 8 9
③③ ② 4 ③③
②②
$18 = ②.②.③$
$72 = ②.2.2.③.3$
GCF=2·3·3=18

ON YOUR OWN

1) 20 and 45

4 ⑤ 9 ⑤
②② ③③
$20 = 2.2.⑤$ GCF=5
$45 = 3.3.⑤$
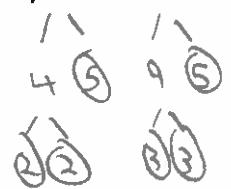
2) 32 and 90
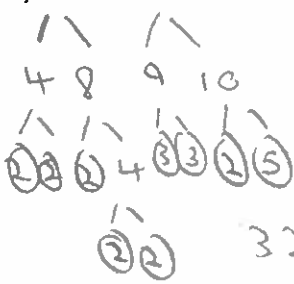
4 8 9 10
②②②4 ③③②⑤   GCF=2
②②
$32 = ②.2.2.2.2$
$90 = ②.3.3.5$

3) 14, 28 and 49

14   28   49

(2)(7) 4 (7) (7)(7)

(2)(2)

$14 = 2 \cdot 7$
$28 = 2 \cdot 2 \cdot 7$
$49 = 7 \cdot 7$

$GCF = 7$

4) 45, 75, and 120

45   75   120

9 (5) 25 (3) 20 6

(3)(3) (5)(5) 4 (5) (2)(3)

              2 2
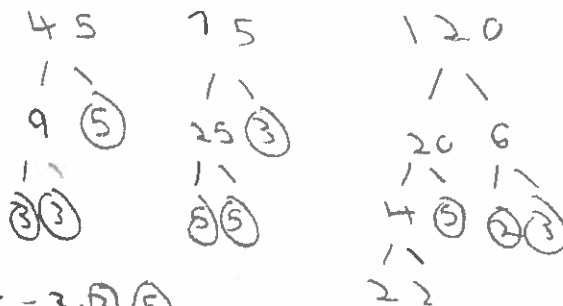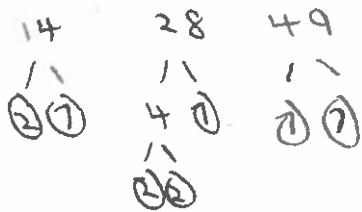
$45 = 3 \cdot 3 \cdot 5$
$75 = 3 \cdot 5 \cdot 5$
$120 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 5$

$GCF = 3 \cdot 5 = 15$

<u>EXAMPLE 4</u>

1) David is making emergency-preparedness kits to share with friends. He has 48 bottles of water and 30 cans of food, which he would like to distribute equally among the kits, with nothing left over. What is the greatest number of kits David can make?

48   30

6 8 6 (5)

(2)(2)(2) 4 (2)(3)

      (2)(2)
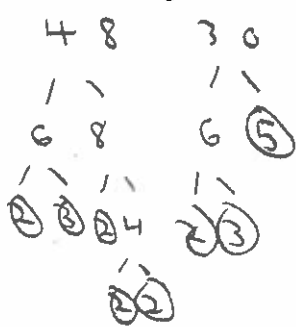
$48 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3$
$30 = 2 \cdot 3 \cdot 5$

$GCF = 2 \cdot 3 = 6$

The greatest number of kits David can make is 6.

2) You are filling pinatas for your sister's birthday party. The list shows the gifts you are putting into the pinatas. You want identical groups of gifts in each pinata with no gifts left over. What is the greatest number of pinatas you can make?

* 18 bottles of nail polish
* 24 pairs of earrings
* 42 hair bows

18   24   42

(2) 9 6 4 6 (7)

(3)(3) (2)(3)(2)(2) (2)(3)

$18 = 2 \cdot 3 \cdot 3$
$24 = 2 \cdot 2 \cdot 2 \cdot 3$
$42 = 2 \cdot 3 \cdot 7$

$GCF = 6$

The greatest number of pinatas you can make is 6.