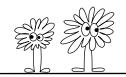
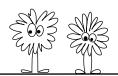
FRACTION NINJA BOOTCAMP LEVEL 2





COMMON FACTORS



For each pair of numbers, find the greatest common factor.

56, 35 Factors of
$$56: 1, 2, 4, 98, 14, 28, 56$$

Factors of $35: 1, 5, 935$
 $gcf(56, 35) = 7$

60, 42 Factors of 60: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60
Factors of 42: 1, 2, 3, 6, 7, 14, 21, 42

$$gcf(60, 42) = 6$$

54,84 Factors of 54: 1,2,3,6,9,18,27,54

Factors of 84: 1,2,3,4,6,7,12,14,21,28,42,84

$$gcf(54,84)=6$$

Here is a cool way to find the greatest common factor of two numbers by writing each number as a product of prime facts. (Prime numbers can't be broken down into a product of smaller numbers.)

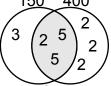
To get the greatest common factor of 150 and 400, we

1. Write each number as a product of primes.

$$150 = 2 \times 3 \times 5 \times 5$$
 and $400 = 2 \times 2 \times 2 \times 2 \times 5 \times 5$

2. Find all the prime factors that were in common.

$$150 = 2 \times 3 \times 5 \times 5$$
 and $400 = 2 \times 2 \times 2 \times 2 \times 5 \times 5$

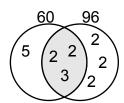


3. Multiply out the prime factors that were in common to get the greatest common factor.

 $2\times5\times5$ = 50 is the greatest common factor of 150 and 400.

Let's try this trick to find the greatest common factor of 60 and 96.

- 1. $60 = 2 \times 2 \times 3 \times 5$ and $96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3$
- 2. The factors in common are 2, 2, and 3.
- 3. The greatest common factor of 60 and 96 is $2 \times 2 \times 3 = 12$.



For each pair of numbers, find the greatest common factor. Can you do it using the technique described above?

 $240 = 2 \times 2 \times 2 \times 2 \times 3 \times 5$

$$75 = 3 \times 5 \times 5$$

$$gcf(240,75) = 3 \times 5$$

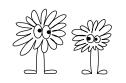
$$= 15.$$

$$112 = 2 \times 2 \times 2 \times 2 \times 7$$

$$128 = 2 \times 2$$

$$gcf(112,128) = 2 \times 2 \times 2 \times 2$$

$$= 16.$$



SIMPLIFYING FRACTIONS



$$\frac{8}{24} = \frac{1}{3}$$

$$\frac{40}{48} = \frac{5}{6}$$

$$\frac{21}{33} = \frac{7}{11}$$

$$\frac{54}{72} = \frac{3}{4}$$

$$\frac{66}{70} = \frac{33}{35}$$

$$\frac{56}{77} = \frac{8}{11}$$

$$\frac{32}{80} = \frac{2}{5}$$

$$\frac{25}{80} = \frac{5}{16}$$

$$\frac{8}{28} = \frac{2}{7}$$

$$\frac{20}{25} = \frac{4}{5}$$

$$\frac{12}{36} = \frac{1}{3}$$

$$\frac{15}{50} = \frac{3}{10}$$

$$\frac{13}{26} = \frac{1}{2}$$

$$\frac{6}{54} = \frac{1}{9}$$

$$\frac{18}{45} = \frac{2}{5}$$

$$\frac{64}{100} = \frac{16}{25}$$

$$\frac{45}{80} = \frac{9}{16}$$

$$\frac{15}{33} = \frac{5}{11}$$

$$\frac{36}{56} = \frac{9}{14}$$

$$\frac{12}{66} = \frac{2}{11}$$

$$\frac{24}{100} = \frac{6}{25}$$

$$\frac{22}{30} = \frac{11}{15}$$

$$\frac{48}{100} = \frac{12}{25}$$

$$\frac{16}{26} = \frac{8}{13}$$

$$\frac{62}{100} = \frac{31}{50}$$

$$\frac{28}{56} = \frac{1}{2}$$

$$\frac{36}{44} = \frac{9}{11}$$

$$\frac{72}{80} = \frac{9}{10}$$

$$\frac{6}{46} = \frac{3}{23}$$

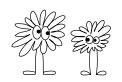
$$\frac{60}{144} = \frac{5}{12}$$

Simplified Fraction Maze

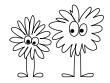
Travel through the maze by only visiting fractions that are in simplified form.

	$\frac{4}{22}$	9 86	$\frac{17}{60}$	$\frac{3}{76}$	13 56	9 109	$\frac{7}{38}$	$\frac{4}{49}$	59 77	$\frac{3}{6}$	63 72	$\frac{4}{5}$	exit
	50 75	2 75	14 35	<u>2</u> 62	65 85	70 77	10 25	<u>4</u> 10	12 37	<u>52</u> 89	4 <u>9</u> 63	7 95	
•	25 45	33 100	1 <u>5</u> 26	<u>1</u> 96	38 53	$\frac{3}{8}$	99 101	<u>36</u> 61	20 30	$\frac{1}{2}$	5 156	49 92	
	16 18	<u>26</u> 66	19 38	13 39	20 42	90 108	15 42	<u>42</u> 81	3/34	<u>21</u> 56	<u>55</u> 66	45 50	
	<u>33</u> 43	1 11	$\frac{21}{26}$	<u>6</u> 11	33 45	18 33	10 18	3/33	13 59	$\frac{43}{70}$	8/83	<u>56</u> 75	
	421	1 <u>5</u> 21	33 55	45 49	42 49	<u>20</u> <u>55</u>	12 24	990	<u>5</u> 15	65 80	36 81	28 41	
	13 15	24 44	7 69 —	<u>17</u> 31	<u>62</u> 66	36 54	<u>6</u> 8	60 75	100 110	<u>81</u> 90	<u>4</u> <u>28</u>	22 25	
	<u>3</u> 7	<u>88</u> 90	<u>3</u> 56	32 58	42 48	<u>8</u> 18	<u>21</u> 42	28 32	<u>11</u> 66	<u>6</u> 32	16 24	<u>3</u> 83	
r →	$-\frac{1}{5}$	30 42	<u>29</u> 34	3 14	<u>5</u> 18	24 43	36 49	17 99	12 67	7/76	$\frac{3}{5}$	1 99	

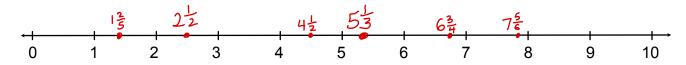
enter



MIXED NUMBERS ON THE NUMBER LINE



Label each number on the number line.



 $5\frac{1}{3}$

 $1\frac{2}{5}$ $7\frac{5}{6}$ $4\frac{1}{2}$

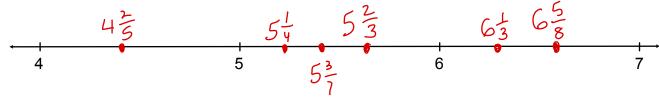
Label each number on the number line.



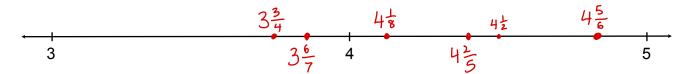
 $9\frac{2}{3}$

 $2\frac{3}{5}$ $1\frac{1}{3}$ $8\frac{2}{5}$

Label each number on the number line.

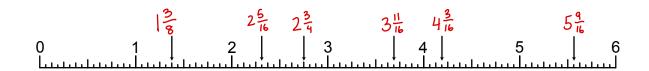


Label each number on the number line.



- $3\frac{6}{7}$
- $4\frac{1}{8}$
- $4\frac{5}{6}$
- $4\frac{2}{5}$
- $3\frac{3}{4}$
- $4\frac{1}{2}$

Inches are a unit of measure that usually gets broken up into 16 equal pieces. Below is a ruler measured in inches. Label each of the arrows with the appropriate fraction. (Be sure to simplify the fraction.)



Centimeters are a unit of measure that usually gets broken up into 10 equal pieces (called millimeters). Below is a 10-centimeter ruler that has locations marked with arrows. Label each arrow with the appropriate fraction. (Be sure to simplify the fraction.)



Do you prefer inches or centimeters as a unit of measurement? Explain why.

There is no wrong answer.

I prefer centimeters because they match
our base - 10 number system.

Calculations with decimals are easier with centimeters.

CONVERTING FRACTIONS TO MIXED NUMBERS

Convert each fraction to a mixed number.

$$\frac{25}{3} = 8\frac{1}{3}$$

$$\frac{29}{5} = 5\frac{4}{5}$$

$$\frac{66}{9} = 7\frac{3}{9} = 7\frac{1}{3}$$

$$\frac{43}{4} = 10\frac{3}{4}$$

$$\frac{51}{7} = 7\frac{2}{7}$$

$$\frac{37}{3} = 12\frac{1}{3}$$

$$\frac{60}{11} = 5\frac{5}{11}$$

$$\frac{60}{8} = 7\frac{4}{8} = 7\frac{1}{2}$$

$$\frac{93}{12} = 7\frac{9}{12} = 7\frac{3}{4}$$

$$\frac{81}{10} = 8 \frac{1}{10}$$

$$\frac{19}{4} = 4\frac{3}{4}$$

$$\frac{31}{7} = 4\frac{3}{1}$$

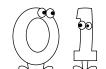
Convert each fraction to a mixed number.

$$\frac{257}{3} = 85\frac{2}{3}$$

$$\frac{214}{7} = 30\frac{4}{7}$$

$$\frac{3,434}{5} = 686 \frac{4}{5}$$

$$\frac{123,456,789}{10} = 12,345,678\frac{9}{10}$$
Dividing by 10 sh-inks all the place values.



CONVERTING MIXED NUMBERS TO FRACTIONS

Convert each mixed number to a fraction.

$$11\frac{1}{2} = \frac{2 \times || + ||}{2}$$

$$= \frac{23}{2}$$

$$6\frac{3}{5} = \frac{5 \times 6 + 3}{5}$$

$$= \frac{33}{5}$$

$$12\frac{3}{7} = \frac{7 \times 12 + 3}{7}$$

$$= \frac{87}{7}$$

$$5\frac{9}{10} = \frac{10 \times 5 + 9}{10}$$

$$= 5\frac{9}{10}$$

$$1\frac{13}{20} = \frac{20 \times 1 + 13}{20}$$
$$= \frac{33}{20}.$$

$$4\frac{11}{12} = \frac{12 \times 4 + 11}{12}$$

$$= \frac{59}{12}$$

$$20\frac{1}{3} = \frac{3 \times 20 + 1}{3}$$

$$= \frac{61}{3}$$

$$8\frac{5}{6} = \frac{6 \times 8 + 5}{6}$$

$$= \frac{53}{6}$$

$$15\frac{2}{3} = \frac{3 \times 15 + 2}{3}$$

$$= \frac{47}{3}$$

$$9\frac{6}{11} = \frac{11 \times 9 + 6}{11}$$

$$= \frac{105}{11}$$

$$6\frac{2}{7} = \frac{7 \times 6 + 2}{7}$$

$$= \frac{44}{7}$$

$$20\frac{3}{4} = \frac{4 \times 20 + 3}{4}$$

$$= \frac{83}{4}$$

Convert each mixed number to a fraction.

$$125\frac{2}{5} = \frac{5 \times 125 + 2}{5}$$

$$= \frac{627}{5}$$

$$100\frac{7}{12} = \frac{12 \times 100 + 7}{12}$$
$$= \frac{1207}{12}$$

$$136\frac{72}{73} = \frac{73 \times 136 + 72}{73}$$

$$= \frac{9,928 + 72}{73}$$

$$= \frac{10,000}{73}$$

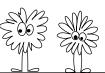
$$99\frac{23}{101} = \frac{101 \times 99 + 23}{101}$$

$$= \frac{9,999 + 23}{101}$$

$$= \frac{10,022}{101}$$



COMPARING FRACTIONS



In each box, declare whether the fractions are "=", "<", or ">" to each other.

$$\frac{8}{24} < \frac{9}{25}$$

$$\frac{6}{32}$$
 $\leq \frac{12}{16}$

$$\frac{14}{50}$$
 $<$ $\frac{21}{60}$

$$\frac{45}{54} = \frac{10}{12}$$

$$\frac{21}{35} = \frac{3}{5}$$

$$\frac{15}{35} \checkmark \frac{5}{11}$$

$$\frac{36}{88} > \frac{10}{25}$$

$$\frac{24}{36}$$
 $\frac{12}{18}$

$$\frac{11}{28} > \frac{4}{14}$$

$$\frac{12}{24} = \frac{22}{44}$$

$$\frac{14}{22} < \frac{2}{3}$$

$$\frac{35}{40} < \frac{9}{10}$$

$$\frac{6}{11} = \frac{30}{55}$$

$$\frac{4}{48}$$
 $\frac{10}{80}$

$$\frac{23}{29} \le \frac{31}{41}$$

$$\frac{20}{120} > \frac{6}{40}$$

$$\frac{26}{52} = \frac{3}{6}$$

$$\frac{22}{24} < \frac{23}{25}$$

Place the following numbers in ascending order (from least to greatest).

$$\frac{3}{7} \quad \frac{5}{6} \quad \frac{1}{2} \quad \frac{2}{5} \quad \frac{4}{9} \quad \frac{5}{8}$$

$$\frac{2}{5} < \frac{3}{7} < \frac{4}{9} < \frac{1}{2} < \frac{5}{8} < \frac{5}{6}$$

Place the following numbers in ascending order (from least to greatest).

$$4\frac{11}{12} \quad 5\frac{1}{4} \quad 6\frac{4}{7} \quad 4\frac{1}{3} \quad 5\frac{5}{6} \quad 4\frac{3}{7}$$

$$4\frac{3}{7} < 4\frac{3}{7} < 5\frac{1}{4} < 5\frac{1}{4} < 5\frac{5}{6} < 6\frac{4}{7}$$

Place the following numbers in ascending order (from least to greatest).

$$\frac{43}{7} \frac{15}{2} \frac{35}{4} \frac{27}{6} \frac{77}{12} \frac{53}{9}$$

$$\frac{27}{6} < \frac{53}{9} < \frac{43}{7} < \frac{77}{12} < \frac{15}{2} < \frac{35}{4}$$

Place the following numbers in ascending order (from least to greatest).

$$6\frac{4}{7} \quad \frac{60}{9} \quad 8\frac{1}{4} \quad \frac{240}{30} \quad \frac{77}{10} \quad 6\frac{11}{12}$$

$$6\frac{4}{7} < \frac{60}{9} < 6\frac{11}{12} < \frac{77}{10} < \frac{240}{30} < 8\frac{1}{4}$$

Some of the quests have pipeflow puzzles. These can be quite challenging, so solutions are included below. Only peek if absolutely necessary.

