MATH DOESN'T SUCK

Solution Guide – Chapter 6

Equivalent Fractions and Reducing Fractions

Doing the Math from p. 66

2) $\frac{1}{2}$

To find equivalent fractions, we'll just multiply the top and bottom by the same number; effectively multiplying the fraction by "1". In other words, we'll use copycat fractions…

$\frac{1}{2} =$

$= \frac{1}{2} \times \frac{\mathbf{2}}{\mathbf{2}} = \frac{1 \times \mathbf{2}}{2 \times \mathbf{2}} = \frac{2}{4}$

$= \frac{1}{2} \times \frac{\mathbf{3}}{\mathbf{3}} = \frac{1 \times \mathbf{3}}{2 \times \mathbf{3}} = \frac{3}{6}$

$= \frac{1}{2} \times \frac{\mathbf{10}}{\mathbf{10}} = \frac{1 \times \mathbf{10}}{2 \times \mathbf{10}} = \frac{10}{20}$

Answer: Some equivalent fractions to $\frac{1}{2}$ are: $\frac{\mathbf{2}}{\mathbf{4}}, \frac{\mathbf{3}}{\mathbf{6}}, \frac{\mathbf{10}}{\mathbf{20}}$.

3) $\frac{4}{3}$

$= \frac{4}{3} \times \frac{\mathbf{2}}{\mathbf{2}} = \frac{4 \times \mathbf{2}}{3 \times \mathbf{2}} = \frac{8}{6}$

$= \frac{4}{3} \times \frac{\mathbf{3}}{\mathbf{3}} = \frac{4 \times \mathbf{3}}{3 \times \mathbf{3}} = \frac{12}{9}$

$= \frac{4}{3} \times \frac{\mathbf{10}}{\mathbf{10}} = \frac{4 \times \mathbf{10}}{3 \times \mathbf{10}} = \frac{40}{30}$

Answer: Some equivalent fractions to $\frac{4}{3}$ are: $\frac{\mathbf{8}}{\mathbf{6}}, \frac{\mathbf{12}}{\mathbf{9}}, \frac{\mathbf{40}}{\mathbf{30}}$.

4) 5

We want to find equivalent expressions, in fraction form, for the value of "5." First we'll rewrite 5 as an improper fraction. $5 = \frac{5}{1}$, so:

$$= \frac{5}{1} \times \frac{\mathbf{2}}{\mathbf{2}} = \frac{5 \times \mathbf{2}}{1 \times \mathbf{2}} = \frac{10}{2}$$
$$= \frac{5}{1} \times \frac{\mathbf{3}}{\mathbf{3}} = \frac{5 \times \mathbf{3}}{1 \times \mathbf{3}} = \frac{15}{3}$$
$$= \frac{5}{1} \times \frac{\mathbf{10}}{\mathbf{10}} = \frac{5 \times \mathbf{10}}{1 \times \mathbf{10}} = \frac{50}{10}$$

Answer: Some equivalent fractions to 5 are: $\frac{\mathbf{10}}{\mathbf{2}}, \frac{\mathbf{15}}{\mathbf{3}}, \frac{\mathbf{50}}{\mathbf{10}}$.

Doing the Math from p.72-73

2) $\frac{12}{18}$

Notice that both 12 and 18 are divisible by 6, so: $\frac{12}{18} = \frac{12 \div \mathbf{6}}{18 \div \mathbf{6}} = \frac{2}{3}$.

Since 2 and 3 don't share any common factors, we've reduced it completely.

Answer: $\frac{12}{18} = \frac{\mathbf{2}}{\mathbf{3}}$

3) $\frac{146}{168}$

Hm, kinda big numbers – but no worries! We'll chip away at it. Notice that top and bottom are both even, so let's divide top and bottom by 2: $\frac{146}{168} = \frac{146 \div \mathbf{2}}{168 \div \mathbf{2}} = \frac{73}{84}$. Do 73 and 84 have any factors in common? Hm, this is tricky. Since we know that $84 = 7 \times 12$ from our times tables, we can write down the prime factorization of 84:

$84 = 7 \times 3 \times 2 \times 2$

So let's test these factors in 73 and see if any will divide in evenly. Not 2, because 73 isn't even. And 7 + 3 = 10, which is not divisible by 3, so 3 isn't a factor. And 7 doesn't divide into it either, since 70 and 77 are multiples of 7. So they don't share any common factors, and so $\frac{73}{84}$ is indeed in reduced form.

Answer: $\frac{146}{168} = \frac{\mathbf{73}}{\mathbf{84}}$

4) $\frac{132}{165}$

They aren't both even, so we can't use 2, so let's try adding up their digits to test for 3 as a common factor: 1 + 3 + 2 = 6. So now we know that 132 is divisible by 3.
Now try 165: 1 + 6 + 5 =12, which is also divisible by 3, so we know that 165 is divisible by 3. Great! So we can divide top and bottom by 3:

$$\frac{132}{165} = \frac{132 \div \mathbf{3}}{165 \div \mathbf{3}} = \frac{44}{55}$$

Aha! Now notice that the top and bottom have 11 as a common factor.

So: $\frac{44}{55} = \frac{44 \div \mathbf{11}}{55 \div \mathbf{11}} = \frac{4}{5}$. And since 4 and 5 don't share any common factors, we're done reducing.

Answer: $\frac{132}{165} = \frac{\mathbf{4}}{\mathbf{5}}$