Learning Enhancement Team

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STUDENT SUPPORT SERVICE

Model Answers: Highest Common Factor/Lowest Common Multiple

Highest Common Factor study guide

Lowest Common Multiple study guide

1. a) 16 and 24

HCF Find the prime factors of 16 and 24 that match up and strike out any others:

$16 = 2 \times 2 \times 2 \times \cancel{2}$
$24 = 2 \times 2 \times 2 \times \cancel{3}$

Multiply the common prime factors to find the HCF:

$\text{HCF}(16, 24) = 2 \times 2 \times 2 = 8$

LCM Using the same list of prime factors, delete the common factors which appear in the list of the smaller number:

$16 = \cancel{2 \times 2 \times 2} \times 2$
$24 = 2 \times 2 \times 2 \times 3$

Multiply the remaining numbers from both lists together to find the LCM.

$\text{LCM}(16, 24) = 2 \times 2 \times 2 \times 2 \times 3 = 48$

b) 7 and 51

HCF Find the prime factors of 7 and 51 that match up and strike out any others:

$7 = 7$
$51 = 3 \times 17$

There are no common prime factors and so:

$\text{HCF}(7,51) = 1$

LCM Using the same list of prime factors, there are no common factors to delete and so you multiply all the prime factors together to find the LCM:

$\text{LCM}(7,51) = 7 \times 3 \times 17 = 357$

c) 12 and 15

HCF Find the prime factors of 12 and 15 that match up and strike out any others:

$12 = \cancel{2 \times 2} \times (3)$
$24 = (3) \times \cancel{5}$

There is one common prime factor and so the HCF is:

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

LCM Using the same list of prime factors, delete the common factor which appears in the list of the smaller number:

$12 = 2 \times 2 \times \cancel{3}$
$24 = 3 \times 5$

Multiply the remaining numbers from both lists together to find the LCM.

$\text{LCM}(12,15) = 2 \times 2 \times 3 \times 5 = 60$

d) 35 and 60

HCF Find the prime factors of 35 and 60 that match up and strike out any others:

$35 = \textcircled{5} \times \cancel{7}$
$60 = \cancel{2 \times 2 \times 3 \times} \textcircled{5}$

There is one common prime factor and so the HCF is:

$\text{HCF}(35, 60) = 5$

LCM Using the same list of prime factors, delete the common factor which appears in the list of the smaller number:

$35 = \cancel{5} \times 7$
$60 = 2 \times 2 \times 3 \times \cancel{5}$

Multiply the remaining numbers from both lists together to find the LCM.

$\text{LCM}(35, 60) = 7 \times 2 \times 2 \times 3 \times 5 = 420$

e) 90 and 175

HCF Find the prime factors of 90 and 175 that match up and strike out any others:

$90 = \cancel{2 \times 3 \times 3 \times} \textcircled{5}$
$175 = \textcircled{5} \times \cancel{5 \times 7}$

There is one common prime factor and so the HCF is:

$\text{HCF}(90, 175) = 5$

LCM Using the same list of prime factors, delete the common factor which appears in the list of the smaller number:

$90 = 2 \times 3 \times 3 \times \cancel{5}$
$175 = 5 \times 5 \times 7$

Multiply the remaining numbers from both lists together to find the LCM.

$$\text{LCM}(90,175) = 2\times3\times3\times5\times5\times7 = 3150$$

f) 270 and 456

HCF Find the prime factors of 270 and 456 that match up and strike out any others:

$$270 = 2\times3\times3\times3\times5$$
$$456 = 2\times2\times2\times3\times19$$

Multiply the common prime factors to find the HCF:

$$\text{HCF}(270,456) = 2\times3 = 6$$

LCM Using the same list of prime factors, delete the common factors which appear in the list of the smaller number:

$$270 = 2\times3\times3\times3\times5$$
$$456 = 2\times2\times2\times3\times19$$

Multiply the remaining numbers from both lists together to find the LCM.

$$\text{LCM}(270,456) = 3\times3\times5\times2\times2\times2\times3\times19 = 20520$$

g) 350 and 672

HCF Find the prime factors of 350 and 672 that match up and strike out any others:

$$350 = 2\times5\times5\times7$$
$$672 = 2\times2\times2\times2\times2\times3\times7$$

Multiply the common prime factors to find the HCF:

$$\text{HCF}(350,672) = 2\times7 = 14$$

LCM Using the same list of prime factors, delete the common factors which appear in the list of the smaller number:

$350 = \cancel{2} \times 5 \times 5 \times \cancel{7}$

$672 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 7$

Multiply the remaining numbers from both lists together to find the LCM.

$\text{LCM}(270, 456) = 5 \times 5 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 7 = 16800$

h) 4 and 6 and 12

HCF Find the prime factors of 4 and 6 and 12 that match up and strike out any others:

$4 = (2) \times \cancel{2}$

$6 = (2) \times \cancel{3}$

$12 = (2) \times \cancel{2 \times 3}$

There is one common prime factor and so the HCF is:

$\text{HCF}(4, 6, 12) = 2$

LCM Using the same list of prime factors of the two smallest numbers 4 and 6, delete the common factor which appears in the list of the smaller number:

$4 = \cancel{2} \times 2$

$6 = 2 \times 3$

Multiply the remaining numbers from both lists together to find the LCM.

$\text{LCM}(4, 6) = 2 \times 2 \times 3 = 12$

Now, the lowest common multiple of 12 and the remaining number, which is also 12, is obviously 12. So

$\text{LCM}(4, 6, 12) = 12$

2. You can use the common factors from the previous questions to help cancel down these fractions.

a) From question 1a:

$16 = 2 \times 2 \times 2 \times 2 = 8 \times 2$
$24 = 2 \times 2 \times 2 \times 3 = 8 \times 3$

Cancelling down the highest common factor gives the fraction in its simplest form.

$$\frac{16}{24} = \frac{\cancel{8} \times 2}{\cancel{8} \times 3} = \frac{2}{3}$$

b) From question 1f:

$270 = 2 \times 3 \times 3 \times 3 \times 5 = 6 \times 45$
$456 = 2 \times 2 \times 2 \times 3 \times 19 = 6 \times 76$

Cancelling down the highest common factor gives the fraction in its simplest form.

$$\frac{270}{456} = \frac{\cancel{6} \times 45}{\cancel{6} \times 76} = \frac{45}{76}$$

c) From questions 1a and 1f:

$24 = 2 \times 2 \times 2 \times 3 = 6 \times 4$
$270 = 2 \times 3 \times 3 \times 3 \times 5 = 6 \times 45$

Cancelling down the highest common factor gives the fraction in its simplest form:

$$\frac{24}{270} = \frac{\cancel{6} \times 4}{\cancel{6} \times 45} = \frac{4}{45}$$

d) From questions 1g:

$350 = 2 \times 5 \times 5 \times 7 = 14 \times 25$
$672 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 7 = 14 \times 48$

Cancelling down the highest common factor gives the fraction in its simplest form:

$$\frac{350}{672} = \frac{\cancel{14} \times 25}{\cancel{14} \times 48} = \frac{25}{48}$$

e) From question 1e:

$$90 = 2 \times 3 \times 3 \times 5 = 5 \times 18$$
$$175 = 5 \times 5 \times 7 = 5 \times 35$$

Cancelling down the highest common factor gives the fraction in its simplest form:

$$\frac{90}{175} = \frac{\cancel{5} \times 18}{\cancel{5} \times 35} = \frac{18}{35}$$

f) From questions 1f and 1g:

$$456 = 2 \times 2 \times 2 \times 3 \times 19 = 24 \times 19$$
$$672 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 7 = 24 \times 28$$

Cancelling down the highest common factor gives the fraction in its simplest form:

$$\frac{456}{672} = \frac{\cancel{24} \times 19}{\cancel{24} \times 28} = \frac{19}{28}$$