

EXERCISE 1.5

1. Multiply:

(i) $7/11$ by $5/4$

Solution:

$7/11$ by $5/4$

$$\begin{aligned}(7/11) \times (5/4) &= (7 \times 5)/(11 \times 4) \\ &= 35/44\end{aligned}$$

(ii) $5/7$ by $-3/4$

Solution:

$5/7$ by $-3/4$

$$\begin{aligned}(5/7) \times (-3/4) &= (5 \times -3)/(7 \times 4) \\ &= -15/28\end{aligned}$$

(iii) $-2/9$ by $5/11$

Solution:

$-2/9$ by $5/11$

$$\begin{aligned}(-2/9) \times (5/11) &= (-2 \times 5)/(9 \times 11) \\ &= -10/99\end{aligned}$$

(iv) $-3/17$ by $-5/-4$

Solution:

$-3/17$ by $-5/-4$

$$\begin{aligned}(-3/17) \times (-5/-4) &= (-3 \times -5)/(17 \times -4) \\ &= 15/-68 \\ &= -15/68\end{aligned}$$

(v) $9/-7$ by $36/-11$

Solution:

$9/-7$ by $36/-11$

$$\begin{aligned}(9/-7) \times (36/-11) &= (9 \times 36)/(-7 \times -11) \\ &= 324/77\end{aligned}$$

(vi) $-11/13$ by $-21/7$

Solution:

$-11/13$ by $-21/7$

$$\begin{aligned}(-11/13) \times (-21/7) &= (-11 \times -21)/(13 \times 7) \\ &= 231/91 = 33/13\end{aligned}$$

(vii) $-3/5$ by $-4/7$

Solution:

$-3/5$ by $-4/7$

$$\begin{aligned}(-3/5) \times (-4/7) &= (-3 \times -4)/(5 \times 7) \\ &= 12/35\end{aligned}$$

(viii) $-15/11$ by 7

Solution:

$-15/11$ by 7

$$\begin{aligned}(-15/11) \times 7 &= (-15 \times 7)/11 \\ &= -105/11\end{aligned}$$

2. Multiply:

(i) $-5/17$ by $51/-60$

Solution:

$-5/17$ by $51/-60$

$$\begin{aligned}(-5/17) \times (51/-60) &= (-5 \times 51)/(17 \times -60) \\ &= -255/-1020\end{aligned}$$

Further can divide by 255 we get,

$$-255/-1020 = 1/4$$

(ii) $-6/11$ by $-55/36$

Solution:

$-6/11$ by $-55/36$

$$\begin{aligned}(-6/11) \times (-55/36) &= (-6 \times -55)/(11 \times 36) \\ &= 330/396\end{aligned}$$

Further can divide by 66 we get,

$$330/396 = 5/6$$

(iii) $-8/25$ by $-5/16$

Solution:

$-8/25$ by $-5/16$

$$\begin{aligned}(-8/25) \times (-5/16) &= (-8 \times -5)/(25 \times 16) \\ &= 40/400\end{aligned}$$

Further can divide by 40 we get,

$$40/400 = 1/10$$

(iv) $6/7$ by $-49/36$

Solution:

6/7 by -49/36

$$(6/7) \times (-49/36) = (6 \times -49)/(7 \times 36) \\ = 294/252$$

Further can divide by 42 we get,
 $294/252 = -7/6$

(v) 8/-9 by -7/-16

Solution:

8/-9 by -7/-16

$$(8/-9) \times (-7/-16) = (8 \times -7)/(-9 \times -16) \\ = -56/144$$

Further can divide by 8 we get,
 $-56/144 = -7/18$

(vi) -8/9 by 3/64

Solution:

-8/9 by 3/64

$$(-8/9) \times (3/64) = (-8 \times 3)/(9 \times 64) \\ = -24/576$$

Further can divide by 24 we get,
 $-24/576 = -1/24$

3. Simplify each of the following and express the result as a rational number in standard form:

(i) (-16/21) × (14/5)

Solution:

$$(-16/21) \times (14/5) = (-16/3) \times (2/5) \text{ (divisible by 7)} \\ = (-16 \times 2)/(3 \times 5) \\ = -32/15$$

(ii) (7/6) × (-3/28)

Solution:

$$(7/6) \times (-3/28) = (1/2) \times (-1/4) \text{ (divisible by 7 and 3)} \\ = -1/8$$

(iii) (-19/36) × 16

Solution:

$$-19/36 \times 16 = (-19/9) \times 4 \text{ (divisible by 4)} \\ = (-19 \times 4)/9 = -76/9$$

(iv) $(-13/9) \times (27/-26)$

Solution:

$$\begin{aligned}(-13/9) \times (27/-26) &= (-1/1) \times (3/-2) \text{ (divisible by 13 and 9)} \\ &= -3/-2 = 3/2\end{aligned}$$

(v) $(-9/16) \times (-64/-27)$

Solution:

$$\begin{aligned}(-9/16) \times (-64/-27) &= (-1/1) \times (-4/-3) \text{ (divisible by 9 and 16)} \\ &= 4/-3 = -4/3\end{aligned}$$

(vi) $(-50/7) \times (14/3)$

Solution:

$$\begin{aligned}(-50/7) \times (14/3) &= (-50/1) \times (2/3) \text{ (divisible by 7)} \\ &= (-50 \times 2)/(1 \times 3) \\ &= -100/3\end{aligned}$$

(vii) $(-11/9) \times (-81/-88)$

Solution:

$$\begin{aligned}(-11/9) \times (-81/-88) &= (-1/1) \times (-9/-8) \text{ (divisible by 11 and 9)} \\ &= (-1 \times -9)/(1 \times -8) \\ &= 9/-8 = -9/8\end{aligned}$$

(viii) $(-5/9) \times (72/-25)$

Solution:

$$\begin{aligned}(-5/9) \times (72/-25) &= (-1/1) \times (8/-5) \text{ (divisible by 5 and 9)} \\ &= (-1 \times 8)/(1 \times -5) \\ &= -8/-5 = 8/5\end{aligned}$$

4. Simplify:

(i) $((25/8) \times (2/5)) - ((3/5) \times (-10/9))$

Solution:

$$\begin{aligned}((25/8) \times (2/5)) - ((3/5) \times (-10/9)) &= (25 \times 2)/(8 \times 5) - (3 \times -10)/(5 \times 9) \\ &= 50/40 - -30/45 \\ &= 5/4 + 2/3 \text{ (divisible by 5 and 3)} \\ &\text{By taking LCM for 4 and 3 which is 12} \\ &= ((5 \times 3) + (2 \times 4))/12 \\ &= (15+8)/12 \\ &= 23/12\end{aligned}$$

(ii) $((1/2) \times (1/4)) + ((1/2) \times 6)$

Solution:

$$((1/2) \times (1/4)) + ((1/2) \times 6) = (1 \times 1)/(2 \times 4) + (1 \times 3) \text{ (divisible by 2)}$$
$$= 1/8 + 3$$

By taking LCM for 8 and 1 which is 8

$$= ((1 \times 1) + (3 \times 8))/8$$
$$= (1 + 24)/8$$
$$= 25/8$$

(iii) $(-5 \times (2/15)) - (-6 \times (2/9))$

Solution:

$$(-5 \times (2/15)) - (-6 \times (2/9)) = (-1 \times (2/3)) - (-2 \times (2/3)) \text{ (divisible by 5 and 3)}$$
$$= (-2/3) + (4/3)$$

Since the denominators are same we can add directly

$$= (-2 + 4)/3$$
$$= 2/3$$

(iv) $((-9/4) \times (5/3)) + ((13/2) \times (5/6))$

Solution:

$$((-9/4) \times (5/3)) + ((13/2) \times (5/6)) = (-9 \times 5)/(4 \times 3) + (13 \times 5)/(2 \times 6)$$
$$= -45/12 + 65/12$$

Since the denominators are same we can add directly

$$= (-45 + 65)/12$$
$$= 20/12 \text{ (divisible by 2)}$$
$$= 10/6 \text{ (divisible by 2)}$$
$$= 5/3$$

(v) $((-4/3) \times (12/-5)) + ((3/7) \times (21/15))$

Solution:

$$((-4/3) \times (12/-5)) + ((3/7) \times (21/15)) = ((-4/1) \times (4/-5)) + ((1/1) \times (3/5)) \text{ (divisible by 3, 7)}$$
$$= (-4 \times 4)/(1 \times -5) + (1 \times 3)/(1 \times 5)$$
$$= -16/-5 + 3/5$$

Since the denominators are same we can add directly

$$= (16 + 3)/5$$
$$= 19/5$$

(vi) $((13/5) \times (8/3)) - ((-5/2) \times (11/3))$

Solution:

$$((13/5) \times (8/3)) - ((-5/2) \times (11/3)) = (13 \times 8)/(5 \times 3) - (-5 \times 11)/(2 \times 3)$$

$$= 104/15 + 55/6$$

By taking LCM for 15 and 6 which is 30

$$= ((104 \times 2) + (55 \times 5))/30$$

$$= (208 + 275)/30$$

$$= 483/30$$

(vii) $((13/7) \times (11/26)) - ((-4/3) \times (5/6))$

Solution:

$$((13/7) \times (11/26)) - ((-4/3) \times (5/6)) = ((1/7) \times (11/2)) - ((-2/3) \times (5/3)) \text{ (divisible by 13, 2)}$$

$$= (1 \times 11)/(7 \times 2) - (-2 \times 5)/(3 \times 3)$$

$$= 11/14 + 10/9$$

By taking LCM for 14 and 9 which is 126

$$= ((11 \times 9) + (10 \times 14))/126$$

$$= (99 + 140)/126$$

$$= 239/126$$

(viii) $((8/5) \times (-3/2)) + ((-3/10) \times (11/16))$

Solution:

$$((8/5) \times (-3/2)) + ((-3/10) \times (11/16)) = ((4/5) \times (-3/1)) + ((-3/10) \times (11/16)) \text{ (divisible by 2)}$$

$$= (4 \times -3)/(5 \times 1) + (-3 \times 11)/(10 \times 16)$$

$$= -12/5 - 33/160$$

By taking LCM for 5 and 160 which is 160

$$= ((-12 \times 32) - (33 \times 1))/160$$

$$= (-384 - 33)/160$$

$$= -417/160$$

5. Simplify:

(i) $((3/2) \times (1/6)) + ((5/3) \times (7/2)) - (13/8) \times (4/3)$

Solution:

$$((3/2) \times (1/6)) + ((5/3) \times (7/2)) - (13/8) \times (4/3) =$$

$$((1/2) \times (1/2)) + ((5/3) \times (7/2)) - (13/2) \times (1/3)$$

$$(1 \times 1)/(2 \times 2) + (5 \times 7)/(3 \times 2) - (13 \times 1)/(2 \times 3)$$

$$1/4 + 35/6 - 13/6$$

By taking LCM for 4 and 6 which is 24

$$((1 \times 6) + (35 \times 4) - (13 \times 4))/24$$

$$(6 + 140 - 52)/24$$

$$94/24$$

Further divide by 2 we get, $94/24 = 47/12$

(ii) $((\frac{1}{4}) \times (\frac{2}{7})) - ((\frac{5}{14}) \times (-\frac{2}{3}) + (\frac{3}{7}) \times (\frac{9}{2}))$

Solution:

$$((\frac{1}{4}) \times (\frac{2}{7})) - ((\frac{5}{14}) \times (-\frac{2}{3}) + (\frac{3}{7}) \times (\frac{9}{2})) =$$

$$((\frac{1}{2}) \times (\frac{1}{7})) - ((\frac{5}{7}) \times (-\frac{1}{3}) + (\frac{3}{7}) \times (\frac{9}{2}))$$

$$(1 \times 1)/(2 \times 7) - (5 \times -1)/(7 \times 3) + (3 \times 9)/(7 \times 2)$$

$$1/14 + 5/21 + 27/14$$

By taking LCM for 14 and 21 which is 42

$$((1 \times 3) + (5 \times 2) + (27 \times 3))/42$$

$$(3 + 10 + 81)/42$$

$$94/42$$

Further divide by 2 we get, $94/42 = 47/21$

(iii) $((\frac{13}{9}) \times (-\frac{15}{2})) + ((\frac{7}{3}) \times (\frac{8}{5}) + (\frac{3}{5}) \times (\frac{1}{2}))$

Solution:

$$((\frac{13}{3}) \times (-\frac{5}{2})) + ((\frac{7}{3}) \times (\frac{8}{5}) + (\frac{3}{5}) \times (\frac{1}{2})) =$$

$$(13 \times -5)/(3 \times 2) + (7 \times 8)/(3 \times 5) + (3 \times 1)/(5 \times 2)$$

$$-65/6 + 56/15 + 3/10$$

By taking LCM for 6, 15 and 10 which is 30

$$((-65 \times 5) + (56 \times 2) + (3 \times 3))/30$$

$$(-325 + 112 + 9)/30$$

$$-204/30$$

Further divide by 2 we get, $-204/30 = -102/15$

(iv) $((\frac{3}{11}) \times (\frac{5}{6})) - ((\frac{9}{12}) \times (\frac{4}{3}) + (\frac{5}{13}) \times (\frac{6}{15}))$

Solution:

$$((\frac{3}{11}) \times (\frac{5}{6})) - ((\frac{9}{12}) \times (\frac{4}{3}) + (\frac{5}{13}) \times (\frac{6}{15})) =$$

$$((\frac{1}{11}) \times (\frac{5}{2})) - ((\frac{1}{1}) \times (\frac{1}{1}) + (\frac{1}{13}) \times (\frac{2}{1}))$$

$$(1 \times 5)/(11 \times 2) - 1/1 + (1 \times 2)/(13 \times 1)$$

$$5/22 - 1/1 + 2/13$$

By taking LCM for 22, 1 and 13 which is 286

$$((5 \times 13) - (1 \times 286) + (2 \times 22))/286$$

$$(65 - 286 + 44)/286$$

$$-177/286$$