Nr. 19–20

LØSNINGSFORSLAG FOR PLUSS OG MINUS MED BRØK OG GANGING OG DELING MED BRØK

FORSKER-
FABRIKKEN

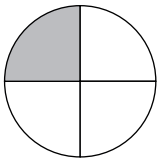
1. opplag – 260810

Hefte 19: Pluss og minus med brøk

1

a) $\frac{1}{4}$ – teller
– nevner

b)



c) Teller er tallet over brøkstreken som sier hvor mange deler du har av noe

Nevner er tallet under brøkstreken som sier hvor mange deler noe er delt inn i.

2

a) Ja.

b) Verdien blir mindre.

c) Verdien blir større.

3

a) Fordi teller er mindre enn nevner.

b) Fordi teller er større enn nevner.

c) Fordi den består av både heltall og brøk.

d) Likeverdige brøker er brøker som har like stor verdi selv om teller og nevner er forskjellige. $\frac{1}{2}$ og $\frac{2}{4}$ er likeverdige brøker.

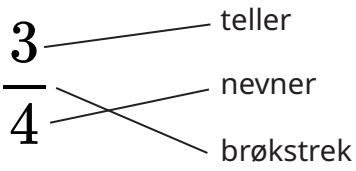
4

a) Vi bruker brøk for å beskrive noe som er delt i **like** store deler.

Telleren forteller hvor mange deler vi har

Nevneren forteller hvor mange deler noe er delt inn i.

b)



5

b) $\frac{6}{9}$ c) $\frac{10}{16}$

d) $\frac{2}{3}$ e) $\frac{4}{6}$ f) $\frac{6}{9}$

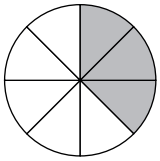
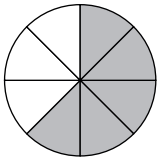
6

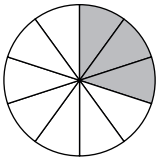
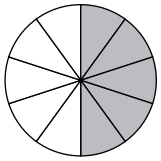
a) $\frac{2}{6}$ b) $\frac{2}{6}$

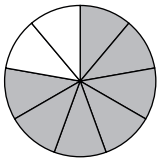
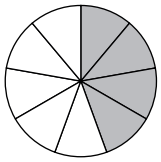
c) $\frac{2}{6}$ d) $\frac{1}{6}$

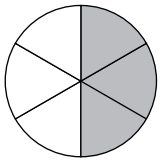
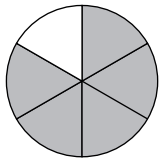
e) $\frac{1}{6}$ f) $\frac{1}{6}$

7

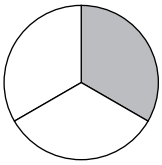
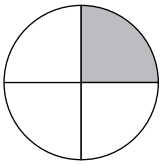
a)  $\frac{3}{8}$  $\frac{5}{8}$

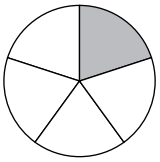
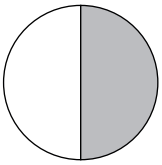
b)  $\frac{3}{10}$  $\frac{5}{10}$

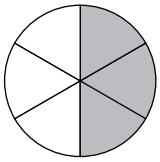
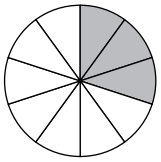
c)  $\frac{7}{9}$  $\frac{4}{9}$

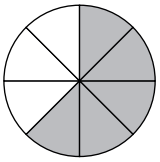
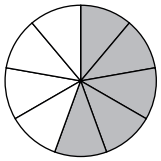
d)  $\frac{3}{6}$  $\frac{5}{6}$

8

a)  $\frac{1}{3}$  $\frac{1}{4}$

b)  $\frac{1}{5}$  $\frac{1}{2}$

c)  $\frac{3}{6}$  $\frac{3}{10}$

d)  $\frac{5}{8}$  $\frac{5}{9}$

9

a) $\frac{1}{14}$ $\frac{1}{7}$ $\frac{1}{3}$

b) $\frac{3}{15}$ $\frac{3}{9}$ $\frac{3}{4}$

c) $\frac{2}{5}$ $\frac{3}{5}$ $\frac{4}{5}$

d) $\frac{2}{18}$ $\frac{2}{5}$ $\frac{2}{4}$

e) $\frac{1}{10}$ $\frac{4}{10}$ $\frac{6}{10}$

f) $\frac{5}{10}$ $\frac{5}{8}$ $\frac{7}{8}$

10

a) Blandet. b) Ekte.

c) Blandet. d) Blandet.

e) Uekte. f) Ekte.

g) Ekte. h) Uekte.

11

a) $\frac{11}{12}$ b) $\frac{17}{18}$ c) $\frac{47}{52}$

12

a) 1 b) 1 c) 1

13

a) $\frac{8}{7} = 1\frac{1}{7}$ b) $\frac{23}{20} = 1\frac{3}{20}$

c) $\frac{12}{15} = 2\frac{2}{5}$ d) $\frac{13}{6} = 2\frac{1}{6}$

14

a) $\frac{5}{12}$ b) $\frac{1}{18}$ c) $\frac{1}{15}$

15

a) $\frac{8}{8} - \frac{5}{8} = \frac{3}{8}$

b) $\frac{18}{18} - \frac{5}{18} = \frac{13}{18}$

c) $\frac{12}{12} - \frac{11}{12} = \frac{1}{12}$

16

a) $\frac{11}{10} = 1\frac{1}{10}$

b) $\frac{9}{5} = 1\frac{4}{5}$

c) $\frac{21}{20} = 1\frac{1}{20}$

17

a) $\frac{2}{4} = \frac{4}{8}$ b) $\frac{2}{3} = \frac{4}{6}$

c) $\frac{2}{4} = \frac{4}{8}$ d) $\frac{4}{8} = \frac{2}{4}$

e) $\frac{4}{6} = \frac{2}{3}$ f) $\frac{2}{3} = \frac{4}{6}$

g) $\frac{4}{6} = \frac{2}{3}$

18

b) $\frac{4}{6}$ c) $\frac{10}{12}$

19

a) $\frac{3}{5}$ b) $\frac{2}{3}$ c) $\frac{5}{6}$

20

a) $\frac{4}{8}$ b) $\frac{6}{10}$

$\frac{6}{12}$ $\frac{9}{15}$

$\frac{8}{16}$ $\frac{12}{20}$

$\frac{10}{20}$ $\frac{15}{25}$

21

a) $\frac{2}{4}$ b) $\frac{3}{5}$

$\frac{2}{4}$ $\frac{3}{5}$

$\frac{2}{4}$ $\frac{3}{5}$

$\frac{2}{4}$ $\frac{3}{5}$

22

b) Fordi $\frac{4}{8} = \frac{1}{2}$ er $\frac{5}{8}$ $\frac{1}{8}$ mer enn $\frac{1}{2}$.

c) Fordi $\frac{6}{12} = \frac{1}{2}$ er $\frac{9}{12}$ $\frac{3}{12}$ mer enn $\frac{1}{2}$.

d) Fordi $\frac{8}{16} = \frac{1}{2}$ er $\frac{10}{16}$ $\frac{2}{16}$ mer enn $\frac{1}{2}$.

e) Fordi $\frac{9}{18} = \frac{1}{2}$ er $\frac{12}{18}$ $\frac{3}{18}$ mer enn $\frac{1}{2}$.

f) Fordi $\frac{10}{20} = \frac{1}{2}$ er $\frac{14}{20}$ $\frac{4}{20}$ mer enn $\frac{1}{2}$.

23

b) $\frac{25}{50}$ c) $\frac{50}{100}$

d) $\frac{100}{200}$ e) $\frac{500}{1000}$

24

b) $\frac{12}{24}$ c) $\frac{11}{22}$

d) $\frac{50}{100}$ e) $\frac{100}{200}$

25

a) $\frac{6}{12} \frac{:3}{:3} = \frac{2}{4}$ b) $\frac{12}{24} \frac{:12}{:12} = \frac{1}{2}$

c) $\frac{10}{20} \frac{:5}{:5} = \frac{2}{4}$ d) $\frac{12}{24} \frac{:6}{:6} = \frac{2}{4}$

e) $\frac{12}{24} \frac{:4}{:4} = \frac{3}{6}$ f) $\frac{18}{36} \frac{:3}{:3} = \frac{6}{12}$

26

a) *NB: Feil i oppgaveteksten i 1. opplag, riktig nevner er 35, ikke 36.*

$$\frac{5}{5}\times\frac{7}{7}=\frac{35}{35}$$

b) $\frac{1}{3}\times\frac{5}{5}=\frac{5}{15}$

c) $\frac{1}{5}\times\frac{3}{3}=\frac{3}{15}$

d) $\frac{2}{7}\times\frac{2}{2}=\frac{4}{14}$

e) $\frac{4}{9}\times\frac{2}{2}=\frac{8}{18}$

f) $\frac{4}{6}\times\frac{4}{4}=\frac{16}{24}$

27

a) $\frac{3}{9}:\frac{3}{3}=\frac{1}{3}$

b) $\frac{4}{8}:\frac{4}{4}=\frac{1}{2}$

c) $\frac{6}{8}:\frac{2}{2}=\frac{3}{4}$

d) $\frac{2}{10}:\frac{2}{2}=\frac{1}{5}$

e) $\frac{4}{6}:\frac{2}{2}=\frac{2}{3}$

f) $\frac{4}{12}:\frac{4}{4}=\frac{1}{3}$

28

Disse brøkene har minste felles nevner:

$$\frac{1}{50}\qquad\frac{3}{11}\qquad\frac{4}{11}\qquad\frac{2}{7}$$

29

a) $\frac{16}{12}=1\frac{4}{12}:\frac{4}{4}=1\frac{1}{3}$

b) $\frac{14}{10}=1\frac{4}{10}:\frac{2}{2}=1\frac{2}{5}$

c) $\frac{27}{18}=1\frac{9}{18}:\frac{9}{9}=1\frac{1}{2}$

d) $\frac{30}{20}=1\frac{10}{20}:\frac{10}{10}=1\frac{1}{2}$

e) $\frac{20}{16}=1\frac{4}{16}:\frac{4}{4}=1\frac{1}{4}$

f) $\frac{30}{24}=1\frac{6}{24}:\frac{6}{6}=1\frac{1}{4}$

g) $\frac{20}{15}=1\frac{5}{15}:\frac{5}{5}=1\frac{1}{3}$

h) $\frac{110}{50}=2\frac{10}{50}:\frac{10}{10}=2\frac{1}{5}$

30

a) $\frac{18}{12} = 1\frac{6}{12}\overset{:6}{:6} = 1\frac{1}{2}$

b) $\frac{8}{6} = 1\frac{2}{6}\overset{:2}{:2} = 1\frac{1}{3}$

c) $\frac{6}{4} = 1\frac{2}{4}\overset{:2}{:2} = 1\frac{1}{2}$

d) $\frac{22}{20} = 1\frac{2}{20}\overset{:2}{:2} = 1\frac{1}{10}$

e) $\frac{22}{16} = 1\frac{6}{16}\overset{:2}{:2} = 1\frac{3}{8}$

f) $\frac{18}{12} = 1\frac{6}{12}\overset{:6}{:6} = 1\frac{1}{2}$

g) $\frac{22}{10} = 2\frac{2}{10}\overset{:2}{:2} = 2\frac{1}{5}$

h) $\frac{60}{50} = 1\frac{10}{50}\overset{:10}{:10} = 1\frac{1}{5}$

i) $\frac{600}{500} = 1\frac{100}{500}\overset{:100}{:100} = 1\frac{1}{5}$

31

a) $8\frac{3}{7}$

b) $7\frac{3}{4}$

c) $12\frac{7}{8}$

d) $5\frac{1}{2}$

e) $22\frac{5}{6}$

f) 11

g) 31

h) 301

i) $601\frac{3}{4}$

j) 10

32

a) $3\frac{3}{7}$

b) $1\frac{1}{4}$

c) $5\frac{1}{8}$

d) $2\frac{2}{3}$

e) $8\frac{1}{2}$

f) $2\frac{2}{3}$

g) $8\frac{1}{3}$

h) $196\frac{4}{7}$

Denne er litt utfordrende, for du kan ikke trekke $\frac{4}{7}$ og $\frac{1}{7}$ fra $\frac{2}{7}$ uten at svaret blir negativt. I stedet kan du hente 1 hel fra 211, slik at stykket blir:

$$210\frac{9}{7} - 7\frac{4}{7} - 7\frac{1}{7} \longrightarrow 210 - 7 - 7 = 196 \rightarrow \\ \longrightarrow \ \tfrac{9}{7} - \tfrac{4}{7} - \tfrac{1}{7} = \tfrac{4}{7} \ \rightarrow \ = 196\frac{4}{7}$$

33

a) $9\frac{1}{2}$

b) $5\frac{1}{3}$

c) $13\frac{3}{4}$

d) $7\frac{1}{2}$

e) $23\frac{2}{3}$

f) $3\frac{2}{5}$

g) 276

h) $125\frac{1}{5}$

34

a) Julian ville ha 2 plommer. Silje ville ha dobbelt så mange.

2 × 2 = 4.

Silje ville ha 4 plommer.

b) $\frac{4}{12}$

c) 12 – 2 – 4 = 6.
Hilde får 6 plommer.

d) $\frac{6}{12}$

35

a) $\frac{21}{8}$

b) $2\frac{5}{8}$

c) Dere må bestille 3 pizzaer.

d) $3 - 2\frac{5}{8} = \frac{24}{8} - \frac{21}{8} = \frac{3}{8}$

Det blir 3 stykker til overs.

36

a) $\frac{18}{6}$

b) $\frac{3}{6} + \frac{3}{6} + \frac{3}{6} = \frac{9}{6}$

$\frac{18}{6} - \frac{9}{6} = \frac{9}{6}$

Dere har 9 ruter igjen.

c) $\frac{9}{6} = 1\frac{3}{6} = 1\frac{1}{2}$

d) Heltallet 1 betyr at dere har en hel sjokoladeplate igjen.

37

a) $\frac{1}{2}\frac{\times 2}{\times 2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4} = \frac{3}{4}$

b) $\frac{1}{4}\frac{\times 4}{\times 4} + \frac{2}{8} = \frac{4}{8} + \frac{2}{8} = \frac{6}{8}\frac{:2}{:2} = \frac{3}{4}$

c) $\frac{1}{2}\frac{\times 5}{\times 5} + \frac{2}{10} = \frac{5}{10} + \frac{2}{10} = \frac{7}{10}$

d) $\frac{2}{6}\frac{\times 2}{\times 2} + \frac{2}{12} = \frac{4}{12} + \frac{2}{12} = \frac{6}{12}\frac{:6}{:6} = \frac{1}{2}$

e) $\frac{2}{4}\frac{\times 3}{\times 3} + \frac{1}{12} = \frac{6}{12} + \frac{1}{12} = \frac{7}{12}$

38

a) $\frac{1}{3}\frac{\times 2}{\times 2} - \frac{1}{6} = \frac{2}{6} - \frac{1}{6} = \frac{1}{6}$

b) $\frac{1}{2}\frac{\times 4}{\times 4} - \frac{2}{8} = \frac{4}{8} - \frac{2}{8} = \frac{2}{8}\frac{:2}{:2} = \frac{1}{4}$

c) $\frac{1}{2}\frac{\times 5}{\times 5} - \frac{2}{10} = \frac{5}{10} - \frac{2}{10} = \frac{3}{10}$

d) $\frac{2}{6}\frac{\times 2}{\times 2} - \frac{2}{12} = \frac{4}{12} - \frac{2}{12} = \frac{2}{12}\frac{:2}{:2} = \frac{1}{6}$

e) $\frac{2}{4}\frac{\times 3}{\times 3} - \frac{1}{12} = \frac{6}{12} - \frac{1}{12} = \frac{5}{12}$

f) $\frac{2}{5}\frac{\times 3}{\times 3} - \frac{3}{15} = \frac{6}{15} - \frac{3}{15} = \frac{3}{15}\frac{:3}{:3} = \frac{1}{5}$

g) $\frac{3}{6}\frac{\times 4}{\times 4} - \frac{1}{24} = \frac{12}{24} - \frac{1}{24} = \frac{11}{24}$

h) $\frac{4}{7}\frac{\times 3}{\times 3} - \frac{1}{21} = \frac{12}{21} - \frac{1}{21} = \frac{11}{21}$

39

a) $\frac{1}{2}\overset{\times 5}{} + \frac{1}{5}\overset{\times 2}{} = \frac{5}{10} + \frac{2}{10} = \frac{7}{10}$

b) $\frac{1}{3}\overset{\times 4}{} + \frac{2}{4}\overset{\times 3}{} = \frac{4}{12} + \frac{6}{12} = \frac{10}{12}\overset{:2}{} = \frac{5}{6}$

c) $\frac{1}{5}\overset{\times 3}{} + \frac{2}{3}\overset{\times 5}{} = \frac{3}{15} + \frac{10}{15} = \frac{13}{15}$

d) $\frac{2}{6}\overset{\times 4}{} + \frac{2}{4}\overset{\times 6}{} = \frac{8}{24} + \frac{12}{24} = \frac{20}{24}\overset{:4}{} = \frac{5}{6}$

e) $\frac{2}{7}\overset{\times 3}{} + \frac{1}{3}\overset{\times 7}{} = \frac{6}{21} + \frac{7}{21} = \frac{13}{21}$

40

a) $\frac{1}{2}\overset{\times 5}{} - \frac{1}{5}\overset{\times 2}{} = \frac{5}{10} - \frac{2}{10} = \frac{3}{10}$

b) $\frac{2}{3}\overset{\times 4}{} - \frac{2}{4}\overset{\times 3}{} = \frac{8}{12} - \frac{6}{12} = \frac{2}{12}\overset{:2}{} = \frac{1}{6}$

c) $\frac{4}{5}\overset{\times 3}{} - \frac{2}{3}\overset{\times 5}{} = \frac{12}{15} - \frac{10}{15} = \frac{2}{15}$

d) $\frac{5}{6}\overset{\times 4}{} - \frac{2}{4}\overset{\times 6}{} = \frac{20}{24} - \frac{12}{24} = \frac{8}{24}\overset{:8}{} = \frac{1}{3}$

e) $\frac{6}{7}\overset{\times 3}{} - \frac{1}{3}\overset{\times 7}{} = \frac{18}{21} - \frac{7}{21} = \frac{11}{21}$

41

a) $\frac{1}{3}\overset{\times 4}{} + \frac{3}{4}\overset{\times 3}{} + \frac{1}{6}\overset{\times 2}{} = \frac{4}{12} + \frac{9}{12} + \frac{2}{12} = \frac{15}{12} = 1\frac{3}{12}\overset{:3}{} = 1\frac{1}{4}$

b) $\frac{2}{6}\overset{\times 2}{} + \frac{1}{4}\overset{\times 3}{} + \frac{1}{2}\overset{\times 6}{} = \frac{4}{12} + \frac{3}{12} + \frac{6}{12} = \frac{13}{12} = 1\frac{1}{12}$

c) $\frac{3}{2}\overset{\times 7}{} + \frac{1}{2}\overset{\times 7}{} + \frac{1}{7}\overset{\times 2}{} = \frac{21}{14} + \frac{7}{14} + \frac{2}{14} = \frac{30}{14} = 2\frac{2}{14}\overset{:2}{} = 2\frac{1}{7}$

42

a) $\frac{5}{4}\overset{\times 5}{} - \frac{1}{4}\overset{\times 5}{} - \frac{1}{20} = \frac{25}{20} - \frac{5}{20} - \frac{1}{20} = \frac{19}{20}$

b) $\frac{2}{8}\overset{\times 2}{} + \frac{1}{4}\overset{\times 4}{} + \frac{1}{16} = \frac{4}{16} + \frac{4}{16} + \frac{1}{16} = \frac{9}{16}$

c) $\frac{11}{12} - \frac{1}{4}\overset{\times 3}{} - \frac{1}{3}\overset{\times 4}{} = \frac{11}{12} - \frac{3}{12} - \frac{4}{12} = \frac{4}{12}\overset{:4}{} = \frac{1}{3}$

43

a) $\frac{10}{10} - \frac{2}{5} - \frac{3}{10} = \frac{10}{10} - \frac{2}{5}\overset{\times 2}{} - \frac{3}{10} = \frac{10}{10} - \frac{4}{10} - \frac{3}{10} = \frac{3}{10}$

Iben brukte $\frac{3}{10}$ time på å spise matpakken sin.

b) 3 × 6 minutter = 18 minutter. Hun brukte 18 minutter på å spise.

44

a) $\frac{1}{20}$ av veggene er malt grønne.

b) Vi vet at det er 20 vegger til sammen, så vi må finne den likeverdige brøken med $\frac{1}{5}$ som har 20 som nevner.

$$\frac{1}{5} \times 4 = \frac{4}{20}$$

$\frac{1}{5}$ av veggene er malt blå.

c) Vi bruker samme fremgangsmåte her som i oppgave b:

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

$\frac{1}{2}$ av veggene er malt hvite.

45

a) Det er 77 elever til sammen.

b) $$\frac{21}{77} : 7 = \frac{3}{11}$$

$\frac{3}{11}$ av elevene vil gå tur.

c) 15 + 25 = 40

$\frac{40}{77}$ av elevene vil spille ballspill.

d) $$\frac{77}{77} - \frac{40}{77} = \frac{37}{77}$$

$\frac{37}{77}$ av elevene vil gjøre noe annet enn ballspill.

46

a) Vi legger sammen de bolletypene vi kjenner til ved å bruke minste felles multiplum:

$$\frac{1}{3} + \frac{1}{4} + \frac{1}{6} = \frac{1}{3} \times 4 + \frac{1}{4} \times 3 + \frac{1}{6} \times 2 = \frac{4}{12} + \frac{3}{12} + \frac{2}{12} = \frac{9}{12} : 3 = \frac{3}{4}$$

$\frac{3}{4}$ av bollene er *ikke* hveteboller. Vi trekker $\frac{3}{4}$ fra én hel, som er $\frac{4}{4}$:

$$\frac{4}{4} - \frac{3}{4} = \frac{1}{4}$$

$\frac{1}{4}$ av bollene er hveteboller.

b) Her må vi finne telleren når vi vet at nevneren er 120:

Skoleboller: $\frac{1}{3} \times 40 = \frac{40}{120}$ Det er 40 skoleboller.

Kanelboller og hveteboller: $\frac{1}{4} \times 30 = \frac{30}{120}$ Det er 30 hver av kanelboller og hveteboller.

Rosinboller: $\frac{1}{4} \times 20 = \frac{20}{120}$ Det er 20 rosinboller.

47

a) $\frac{2}{6}\begin{matrix}:2\\:2\end{matrix}=\frac{1}{3}$ Minste felles nevner er 3.

b) $\frac{1}{3}+\frac{2}{6}=\frac{1}{3}+\frac{2}{6}\begin{matrix}:2\\:2\end{matrix}=\frac{1}{3}+\frac{1}{3}=\frac{2}{3}$

$1\ \text{time}\ =\ \frac{60}{60}\quad \frac{2}{3}\begin{matrix}\times 20\\\times 20\end{matrix}=\frac{40}{60}$

07.15 + 40 minutter = 07.55.

De er fremme på skolen 07.55.

48

a)

$$\frac{6}{5}+\frac{2}{10}+\frac{2}{5}+\frac{7}{10}=\frac{6}{5}\begin{matrix}\times 2\\\times 2\end{matrix}+\frac{2}{10}+\frac{2}{5}\begin{matrix}\times 2\\\times 2\end{matrix}+\frac{7}{10}=\frac{12}{10}+\frac{2}{10}+\frac{4}{10}+\frac{7}{10}=\frac{25}{10}=2\frac{5}{10}$$

De må bestille 3 pizzaer.

b) $3\ \text{pizzaer}\ =\ \frac{30}{10}$

$$\frac{30}{10}-\frac{25}{10}=\frac{5}{10}$$

Det ble 5 stykker pizza til overs.

Hefte 20: Ganging og deling med brøk

1

a) b = 4.

b) b = 13

c) b = 29

2

a) c = 7

b) c = 14

c) c = 30

3

a) b = 4

b) b = 16

c) b = 30

4

a) c = 11

b) c = 19

c) c = 53

5

a) $1\frac{1}{4}$ b) $2\frac{1}{4}$

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

6

a) $\frac{9}{10}$ b) $1\frac{2}{10}$

c) $2\frac{4}{10}$

7

a) $\frac{3}{10}$ b) 1

c) $1\frac{2}{10} = 1\frac{1}{5}$

8

a) $1\frac{1}{2}$ b) $1\frac{2}{3}$

c) $3\frac{1}{2}$ d) $1\frac{3}{4}$

9

a) $\frac{4 \times 4}{7 \times 3} = \frac{16}{21}$

b) $\frac{3 \times 5}{6 \times 9} = \frac{15:3}{54:3} = \frac{5}{18}$

c) $\frac{5 \times 10}{8 \times 4} = \frac{50}{32} = 1\frac{18:2}{32:2} = 1\frac{9}{16}$

d) $\frac{1 \times 70}{3 \times 10} = \frac{70}{30} = 2\frac{10:10}{30:10} = 2\frac{1}{3}$

e) $\frac{3 \times 3}{3 \times 3} = \frac{9}{9} = 1$

10

a) $\frac{5 \times 9}{9 \times 5} = \frac{45}{45} = 1$

b) $\frac{5 \times 3}{9 \times 4} = \frac{15:3}{36:3} = \frac{5}{12}$

c) $\frac{3 \times 7}{2 \times 8} = \frac{21}{16} = 1\frac{5}{16}$

d) $\frac{8 \times 3}{9 \times 4} = \frac{24:12}{36:12} = \frac{2}{3}$

e) $\frac{6 \times 5}{8 \times 3} = \frac{30}{24} = 1\frac{6}{24}\,{}^{:6}_{:6} = 1\frac{1}{4}$

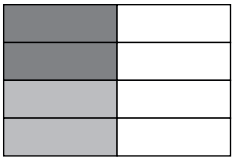
f) $\frac{4 \times 7}{6 \times 5} = \frac{28}{30}\,{}^{:2}_{:2} = \frac{14}{15}$

g) $\frac{2 \times 7}{7 \times 3} = \frac{14}{21}\,{}^{:7}_{:7} = \frac{2}{3}$

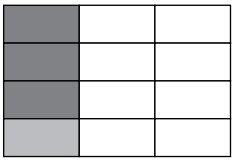
h) $\frac{3 \times 9}{9 \times 2} = \frac{27}{18} = 1\frac{9}{18}\,{}^{:9}_{:9} = 1\frac{1}{2}$

11

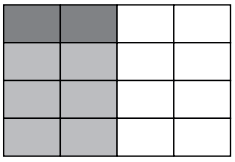
a) $\frac{2}{8}$



b) $\frac{3}{12}$



c) $\frac{2}{16}$



12

a) $\frac{3}{12}$

b) $\frac{1}{5} \times \frac{1}{3} = \frac{3}{12}$

c) $\frac{2}{4} \times \frac{1}{3} = \frac{2}{12}$

13

a) $\frac{1 \times 1}{4 \times 5} = \frac{1}{20}$

b) $\frac{1 \times 1}{5 \times 4} = \frac{1}{20}$

c) $\frac{1 \times 1}{5 \times 7} = \frac{1}{35}$

d) $\frac{1 \times 1}{7 \times 5} = \frac{1}{35}$

e) $\frac{1 \times 1}{10 \times 2} = \frac{1}{20}$

f) $\frac{1 \times 1}{2 \times 10} = \frac{1}{20}$

Rekkefølgen på brøkene har ikke noe å si for svaret du får.

14

a) $1\frac{1}{6}$

b) $\frac{8}{15}$

c) $1\frac{1}{4}$

d) $\frac{15}{32}$

e) $\frac{5}{7}$

f) $1\frac{1}{5}$

15

a) $\frac{8}{15}$

b) $\frac{12}{25}$

c) $\frac{9}{14}$

d) $\frac{2}{3}$

e) $\frac{1}{4}$

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

16

b) $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{4}{3} = 1\frac{1}{3}$

c) $\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{5}{6}$

d) $\frac{3}{5} + \frac{3}{5} + \frac{3}{5} + \frac{3}{5} = \frac{12}{5} = 2\frac{2}{5}$

e) $\frac{3}{4} + \frac{3}{4} = 1\frac{2}{4}\,{}^{:2}_{:2} = 1\frac{1}{2}$

f) $\frac{3}{7} + \frac{3}{7} + \frac{3}{7} + \frac{3}{7} + \frac{3}{7} = \frac{15}{7} = 2\frac{1}{7}$

17

b) $\frac{5 \times 2}{9} = \frac{10}{9} = 1\frac{1}{9}$

c) $\frac{6 \times 5}{9} = \frac{30}{9} = 3\frac{3}{9}\,{}^{:3}_{:3} = 3\frac{1}{3}$

d) $\frac{7 \times 2}{6} = \frac{14}{6} = 2\frac{2}{6}\,{}^{:2}_{:2} = 2\frac{1}{3}$

18

a) $\frac{3}{1} \times \frac{1}{4} = \frac{3 \times 1}{1 \times 4} = \frac{3}{4}$

b) $\frac{3}{1} \times \frac{2}{5} = \frac{3 \times 2}{1 \times 5} = \frac{6}{5} = 1\frac{1}{5}$

c) $\frac{7}{1} \times \frac{3}{4} = \frac{7 \times 3}{1 \times 4} = \frac{21}{4} = 5\frac{1}{4}$

d) $\frac{4}{1} \times \frac{2}{5} = \frac{4 \times 2}{1 \times 5} = \frac{8}{5} = 1\frac{3}{5}$

e) $\frac{4}{1} \times \frac{2}{6} = \frac{4 \times 2}{1 \times 6} = \frac{8}{6} = 1\frac{2}{6} \,{:}2 \,{:}2 = 1\frac{1}{3}$

f) $\frac{4}{1} \times \frac{2}{5} = \frac{4 \times 2}{1 \times 5} = \frac{8}{5} = 1\frac{3}{5}$

19

a) $\frac{4 \times 1}{3 \times 3} = \frac{4}{9}$ $\frac{4 \times 2}{3 \times 6} = \frac{8}{18} \,{:}2 \,{:}2 = \frac{4}{9}$

b) $\frac{5 \times 1}{4 \times 3} = \frac{5}{12}$ $\frac{5 \times 2}{4 \times 6} = \frac{10}{24} \,{:}2 \,{:}2 = \frac{5}{12}$

c) $\frac{7 \times 1}{9 \times 3} = \frac{7}{27}$ $\frac{7 \times 2}{9 \times 6} = \frac{14}{54} \,{:}2 \,{:}2 = \frac{7}{27}$

d) $\frac{8 \times 1}{10 \times 3} = \frac{8}{30} \,{:}2 \,{:}2 = \frac{4}{15}$

$\frac{8 \times 2}{10 \times 6} = \frac{16}{60} \,{:}4 \,{:}4 = \frac{4}{15}$

Svaret blir det samme når du ganger med en likeverdig brøk.

20

a) Vi utvider brøkene så nevneren blir 20.

$\frac{1 \times 5}{4 \times 5} = \frac{5}{20}$ $\frac{2 \times 4}{5 \times 4} = \frac{8}{20}$

$\frac{8}{20} \times \frac{5}{20} = \frac{40}{400} \,{:}20 \,{:}20 = \frac{2}{20}$

Vicky får 2 ruter.

b) Vi utvider brøkene så nevneren blir 20.

$\frac{2 \times 5}{4 \times 5} = \frac{10}{20}$ $\frac{3 \times 4}{5 \times 4} = \frac{12}{20}$

$\frac{12}{20} \times \frac{10}{20} = \frac{120}{400} \,{:}20 \,{:}20 = \frac{6}{20}$

Ellinor får 6 ruter.

21

a) Vi utvider brøkene så nevneren blir 15.

$\frac{3 \times 3}{5 \times 3} = \frac{9}{15}$ $\frac{1 \times 5}{3 \times 5} = \frac{5}{15}$

$\frac{9}{15} \times \frac{5}{15} = \frac{45}{225} \,{:}15 \,{:}15 = \frac{3}{15}$

Marius skal dyrke poteter på 3 deler.

b) $2 \times \frac{3}{15} = \frac{2 \times 3}{15} = \frac{6}{15}$

Anestis får 6 deler å dyrke på.

22

a) $3 \times \frac{1}{16} = \frac{3 \times 1}{16} = \frac{3}{16}$

Klassen til Mina skal dyrke på $\frac{3}{16}$.

b) $\frac{3}{16} + \frac{3}{16} + \frac{3}{16} = \frac{9}{16}$

Til sammen er $\frac{9}{16}$ av skolehagen opptatt.

c) $\frac{16}{16} - \frac{9}{16} = \frac{7}{16}$

$\frac{7}{16}$ av skolehagen er fremdeles ledig.

23

a) $7 \times \frac{2}{20} = \frac{7 \times 2}{20} = \frac{14}{20}$

De syv eierene eier til sammen $\frac{14}{20}$.

b) $\frac{20}{20} - \frac{14}{20} = \frac{6}{20}$

Det er igjen $\frac{6}{20}$ til de andre.

c) Det er 6 ledige deler, og hver person skal ha 2 deler hver.

6 : 2 = 3

3 personer til kan dyrke.

24

a) $\frac{6}{4}$ b) $\frac{7}{2}$ c) $\frac{35}{10}$

d) $\frac{9}{7}$ e) $\frac{2}{9}$ f) $\frac{4}{15}$

25

a) $\frac{4}{7} \times \frac{3}{4} = \frac{12:4}{28:4} = \frac{3}{7}$

b) $\frac{3}{6} : \frac{5}{9} = \frac{3}{6} \times \frac{9}{5} = \frac{27:3}{30:3} = \frac{9}{10}$

c) $\frac{5}{8} : \frac{10}{4} = \frac{5}{8} \times \frac{4}{10} = \frac{20:20}{80:20} = \frac{1}{4}$

d) $\frac{1}{3} : \frac{7}{2} = \frac{1}{3} \times \frac{2}{7} = \frac{2}{21}$

26

a) $\frac{1}{2} \times \frac{3}{2} = \frac{3}{4}$

b) $\frac{2}{3} \times \frac{4}{1} = \frac{8}{3} = 2\frac{2}{3}$

c) $\frac{4}{5} \times \frac{4}{1} = \frac{16}{5} = 3\frac{1}{5}$

d) $\frac{6}{8} \times \frac{4}{2} = \frac{24}{16} = 1\frac{8}{16}\frac{:8}{:8} = 1\frac{1}{2}$

e) $\frac{3}{5} \times \frac{4}{2} = \frac{12}{10} = 1\frac{2}{10}\frac{:2}{:2} = 1\frac{1}{5}$

f) $\frac{9}{5} \times \frac{6}{4} = \frac{54}{20} = 2\frac{14}{20}\frac{:2}{:2} = 2\frac{7}{10}$

27

a) $\frac{1}{4} \times \frac{5}{1} = \frac{5}{4} = 1\frac{1}{4}$

b) $\frac{1}{5} \times \frac{4}{1} = \frac{4}{5}$

c) $\frac{1}{10} \times \frac{2}{1} = \frac{2}{10}\frac{:2}{:2} = \frac{1}{5}$

d) $\frac{1}{2} \times \frac{10}{1} = \frac{10}{2} = 5$

e) $\frac{1}{5} \times \frac{7}{1} = \frac{7}{5} = 1\frac{2}{5}$

f) $\frac{1}{7} \times \frac{5}{1} = \frac{5}{7}$

Svarene blir ulike når vi gjør om rekkefølgen på brøkene.

28

a) $\frac{5}{7} \times \frac{8}{2} = \frac{40}{14} = 2\frac{12}{14}\overset{:2}{\underset{:2}{}} = 2\frac{6}{7}$

b) $\frac{6}{9} \times \frac{4}{2} = \frac{24}{18} = 1\frac{6}{18}\overset{:6}{\underset{:6}{}} = 1\frac{1}{3}$

c) $\frac{7}{9} \times \frac{6}{2} = \frac{42}{18} = 2\frac{6}{18}\overset{:6}{\underset{:6}{}} = 2\frac{1}{3}$

d) $\frac{5}{8} \times \frac{5}{3} = \frac{25}{24} = 1\frac{1}{24}$

e) $\frac{7}{4} \times \frac{2}{8} = \frac{14}{32}\overset{:2}{\underset{:2}{}} = \frac{7}{16}$

f) $\frac{3}{7} \times \frac{8}{1} = \frac{24}{7} = 3\frac{3}{7}$

29

a) $1\frac{1}{2}$ b) $\frac{4}{15}$

c) $1\frac{1}{2}$ d) $1\frac{1}{3}$

e) $\frac{8}{15}$ f) 2

30

b) $\frac{1}{8}$ c) $\frac{1}{10}$

31

a) $\frac{2}{3} : 3 = \frac{2}{9}$



b) $\frac{1}{3} : 4 = \frac{1}{12}$

c) $\frac{1}{4} : 4 = \frac{1}{16}$

NB: Her er figuren feil i 1. opplag, den viser $\frac{1}{8}$.

d) $\frac{1}{5} : 3 = \frac{1}{15}$

e) $\frac{3}{4} : 3 = \frac{3}{12}$

f) $\frac{2}{4} : 4 = \frac{2}{16}$

g) $\frac{2}{4} : 3 = \frac{2}{12}$

Oppgave g med formelen:

$$\frac{2}{4 \times 3} = \frac{2}{12}$$

Oppgave f med formelen:

$$\frac{2}{4 \times 4} = \frac{2}{16}$$

32

a) $\frac{4 \times 1}{4 \times 3} = \frac{4}{12}\overset{:4}{\underset{:4}{}} = \frac{1}{3}$

b) $\frac{2 \times 1}{4 \times 4} = \frac{2}{16}\overset{:2}{\underset{:2}{}} = \frac{1}{8}$

c) $\frac{3 \times 1}{4 \times 3} = \frac{3}{12}\overset{:4}{\underset{:4}{}} = \frac{1}{4}$

33

a) $\frac{3 \times 2}{5 \times 4} = \frac{6}{20}\overset{:2}{\underset{:2}{}} = \frac{3}{10}$

b) $\frac{3 \times 2}{6 \times 5} = \frac{6}{30}\overset{:6}{\underset{:6}{}} = \frac{1}{5}$

c) $\frac{2 \times 2}{8 \times 4} = \frac{4}{32}\overset{:4}{\underset{:4}{}} = \frac{1}{8}$

d) $\frac{4 \times 3}{9 \times 2} = \frac{12}{18}\overset{:6}{\underset{:6}{}} = \frac{2}{3}$

34

a) $\frac{16}{40}$

b) $\frac{17}{35}$

c) $\frac{7}{3}$

d) $\frac{4}{2}$

e) $\frac{16}{16}$

f) $\frac{26}{40}$

g) $\frac{14}{24}$

h) $\frac{13}{35}$

35

a) 2

b) 2

c) 20 : 10 = 2

d) Svarene blir de samme.

e) 6

f) 6

g) $\frac{6}{1} = 6$

h) Svarene blir de samme.

36

b) $\frac{3}{6} : \frac{8}{8} = \frac{3}{6} : 1 = \frac{3}{6} = \frac{1}{2}$

c) $\frac{5}{9} : \frac{21}{21} = \frac{5}{9} : 1 = \frac{5}{9}$

37

a) $\frac{18}{9} \times 1 = \frac{18}{9} = 2$

b) $\left(\frac{3}{4} \times \frac{5}{3}\right) : \frac{15}{15} = \frac{15}{12} \times 1 = 1\frac{3}{12}\overset{:3}{_{:3}} = 1\frac{1}{4}$

c) $\frac{4}{6} : \frac{2}{4} = \left(\frac{4}{6} \times \frac{4}{2}\right) : \left(\frac{2}{4} \times \frac{4}{2}\right) = \left(\frac{4}{6} \times \frac{4}{2}\right) : \frac{8}{8} = \frac{16}{12} \times 1 = 1\frac{4}{12}\overset{:4}{_{:4}} = 1\frac{1}{3}$

d) $\frac{2}{4} : \frac{3}{6} = \left(\frac{2}{4} \times \frac{6}{3}\right) : \left(\frac{3}{6} \times \frac{6}{3}\right) = \left(\frac{2}{4} \times \frac{6}{3}\right) : \frac{18}{18} = \frac{12}{12} \times 1 = \frac{12}{12} = 1$

Forklaringen til oppgave 37 er på neste side.

Forklaring til oppgave 37

Når vi deler brøker, ganger vi begge brøkene med den resiproke brøken av divisoren (brøken vi deler med).

Hvorfor gjør vi det? Se på et enkelt regnestykke: 8 : 1 = 8. Når vi deler på 1, skjer det ingenting med tallet. Det samme gjelder brøker: hvis divisoren (det vi deler på) blir 1, forsvinner selve delingen, og vi sitter igjen med kun det som står på den andre siden.

Vi trenger derfor en måte å gjøre $\frac{c}{d}$ om til 1 på. Det får vi til ved å gange brøken med sin egen resiproke, siden dette alltid gir 1, uansett hvilke tall c og d er:

$$\frac{c}{d} \times \frac{d}{c} = 1$$

Men vi kan ikke bare gjøre dette med den ene brøken – da ville vi endret verdien av hele regnestykket. Akkurat som når man utvider en vanlig brøk, må vi gange begge sider av divisjonsstykket med det samme tallet for at verdien skal holde seg lik.

Da får vi:

$$\frac{a}{b} : \frac{c}{d} = \left(\frac{a}{b} \times \frac{d}{c}\right) : \left(\frac{c}{d} \times \frac{d}{c}\right) = \left(\frac{a}{b} \times \frac{d}{c}\right) : 1$$

Å dele på 1 forandrer ikke verdien, så vi kan forenkle til:

$$\frac{a}{b} : \frac{c}{d} = \frac{a \times d}{b \times c}$$

38

a) $\frac{2}{5} : \frac{3}{6} = \frac{2}{5} \times \frac{6}{3} = \frac{12}{15} \overset{:3}{:3} = \frac{4}{5}$

b) $\frac{1}{6} : \frac{2}{7} = \frac{1}{6} \times \frac{7}{2} = \frac{7}{12}$

c) $\frac{4}{9} : \frac{2}{3} = \frac{4}{9} \times \frac{3}{2} = \frac{12}{18} \overset{:6}{:6} = \frac{2}{3}$

d) $\frac{6}{9} : \frac{2}{4} = \frac{6}{9} \times \frac{4}{2} = \frac{24}{18} = 1\frac{6}{18} \overset{:6}{:6} = 1\frac{1}{3}$

e) $\frac{5}{6} : \frac{3}{5} = \frac{5}{6} \times \frac{5}{3} = \frac{25}{18} = 1\frac{7}{18}$

f) $\frac{a}{b} : \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{a \times d}{b \times c}$

39

a) 1 b) $\frac{5}{12}$

c) $1\frac{5}{16}$ d) $\frac{2}{3}$

e) $1\frac{1}{5}$ f) $\frac{14}{15}$

g) $\frac{2}{3}$ h) $1\frac{1}{2}$

i) $\frac{1}{35}$ j) $\frac{1}{35}$

k) $\frac{1}{20}$ l) $\frac{1}{20}$

40

a) 1

b) $1\frac{1}{9}$

c) $3\frac{1}{3}$

d) $2\frac{1}{3}$

e) $5\frac{1}{4}$

f) $1\frac{3}{5}$

g) $1\frac{1}{3}$

h) $1\frac{3}{5}$

41

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

b) $2\frac{2}{3}$

c) $3\frac{1}{5}$

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

e) $1\frac{1}{5}$

f) $2\frac{7}{10}$

g) $2\frac{1}{3}$

h) $1\frac{1}{24}$

i) $\frac{7}{16}$

j) $3\frac{3}{7}$

42

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

b) $\frac{2}{9}$

c) $\frac{8}{27}$

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

e) $\frac{1}{8}$

f) $\frac{3}{20}$

g) $\frac{1}{27}$

h) $\frac{1}{18}$

43

a) $\frac{3}{16}$

b) $\frac{2}{3}$

c) $\frac{8}{15}$

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

e) $1\frac{1}{5}$

f) $\frac{3}{10}$

g) $1\frac{1}{8}$

h) $\frac{5}{12}$

i) $\frac{3}{8}$

j) $1\frac{1}{7}$