EXAM PAPERS PRACTICE

Fractions

Model Answers

Question 1

Work out the value of $\dfrac{-\frac{1}{2}-\frac{3}{8}}{-\frac{1}{2}+\frac{3}{8}}$. [2]

Answer

$$\dfrac{-\frac{1}{2}-\frac{3}{8}}{-\frac{1}{2}+\frac{3}{8}}$$

Least common multiple of 2 and 8 is 8. Convert $-\frac{1}{2}$ and $\frac{3}{8}$ to fractions with denominator 8.

$$\dfrac{-\frac{4}{8}-\frac{3}{8}}{-\frac{1}{2}+\frac{3}{8}}$$

Since $-\frac{4}{8}$ and $\frac{3}{8}$ have the same denominator, subtract them by subtracting their numerators.

$$\dfrac{\frac{-4-3}{8}}{-\frac{1}{2}+\frac{3}{8}}$$

Subtract 3 from -4 to get -7.

$$\dfrac{-\frac{7}{8}}{-\frac{1}{2}+\frac{3}{8}}$$

Least common multiple of 2 and 8 is 8. Convert $-\frac{1}{2}$ and $\frac{3}{8}$ to fractions with denominator 8.

$$\dfrac{-\frac{7}{8}}{-\frac{4}{8}+\frac{3}{8}}$$

Since $-\frac{4}{8}$ and $\frac{3}{8}$ have the same denominator, add them by adding their numerators.

$$\dfrac{-\frac{7}{8}}{\frac{-4+3}{8}}$$

Add -4 and 3 to get -1.

$$\dfrac{-\frac{7}{8}}{-\frac{1}{8}}$$

Divide $-\frac{7}{8}$ by $-\frac{1}{8}$ by multiplying $-\frac{7}{8}$ by the reciprocal of $-\frac{1}{8}$.

$$-\frac{7}{8}\left(-8\right)$$

Express $-\frac{7}{8}\left(-8\right)$ as a single fraction.

$$\dfrac{-7\left(-8\right)}{8}$$

Multiply -7 and -8 to get 56.

$$\dfrac{56}{8}$$

Divide 56 by 8 to get 7.

$$7$$

Question 2

Write down all the working to show that $\dfrac{\frac{3}{5}+\frac{2}{3}}{\frac{3}{5}\times\frac{2}{3}} = 3\frac{1}{6}$ [3]

Multiply both sides of the equation by 6.

$$15\left(\frac{3}{5}+\frac{2}{3}\right) = 3\times 6 + 1$$

Least common multiple of 5 and 3 is 15. Convert $\frac{3}{5}$ and $\frac{2}{3}$ to fractions with denominator 15.

$$15\left(\frac{9}{15}+\frac{10}{15}\right) = 3\times 6 + 1$$

Since $\frac{9}{15}$ and $\frac{10}{15}$ have the same denominator, add them by adding their numerators.

$$15\times\left(\frac{9+10}{15}\right) = 3\times 6 + 1$$

Add 9 and 10 to get 19.

$$15\times\left(\frac{19}{15}\right) = 3\times 6 + 1$$

Cancel out 15 and 15.

$$19 = 3\times 6 + 1$$

Multiply 3 and 6 to get 18.

$$19 = 18 + 1$$

Add 18 and 1 to get 19.

$$19 = 19$$

Compare 19 and 19.

True

Question 3

5   Jiwan incorrectly wrote $1 + \dfrac{1}{2} + \dfrac{1}{3} + \dfrac{1}{4} = 1\dfrac{3}{9}$.

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} = 1\frac{3}{9}$$

Multiply both sides of the equation by 36, the least common multiple of $2, 3, 4, 9$.

$$36 + 18 + 12 + 9 = 4(1\times 9 + 3)$$

Add 36 and 18 to get 54.

$$54 + 12 + 9 = 4(1\times 9 + 3)$$

Add 54 and 12 to get 66.

$$66 + 9 = 4(1\times 9 + 3)$$

Add 66 and 9 to get 75.

$$75 = 4(1\times 9 + 3)$$

Multiply 1 and 9 to get 9.

$$75 = 4(9 + 3)$$

Add 9 and 3 to get 12.

$$75 = 4\times 12$$

Multiply 4 and 12 to get 48.

$$75 = 48$$

Compare 75 and 48.

False

Exam Papers Practice

Question 4

Show that $3^{-2} + 2^{-2} = \dfrac{13}{36}$.

Write down all the steps of your working.

[2]

$$3^{-2} + 2^{-2} = \frac{13}{36}$$

| Calculate 3 to the power of -2 and get $\frac{1}{9}$.

$$\frac{1}{9} + 2^{-2} = \frac{13}{36}$$

| Calculate 2 to the power of -2 and get $\frac{1}{4}$.

$$\frac{1}{9} + \frac{1}{4} = \frac{13}{36}$$

| Add $\frac{1}{9}$ and $\frac{1}{4}$ to get $\frac{13}{36}$.

$$\frac{13}{36} = \frac{13}{36}$$

| Compare $\frac{13}{36}$ and $\frac{13}{36}$.

True

Question 5

Show that $1\dfrac{5}{9} \div 1\dfrac{7}{9} = \dfrac{7}{8}$.

Write down all the steps in your working.

[2]

| Divide $\frac{1 \times 9 + 5}{9}$ by $\frac{1 \times 9 + 7}{9}$ by multiplying $\frac{1 \times 9 + 5}{9}$ by the reciprocal of $\frac{1 \times 9 + 7}{9}$.

$$\frac{(1 \times 9 + 5) \times 9}{9\,(1 \times 9 + 7)} = \frac{7}{8}$$

| Cancel out 9 in both numerator and denominator.

$$\frac{5 + 9}{7 + 9} = \frac{7}{8}$$

| Add 5 and 9 to get 14.

$$\frac{14}{7 + 9} = \frac{7}{8}$$

| Add 7 and 9 to get 16.

$$\frac{14}{16} = \frac{7}{8}$$

| Reduce the fraction $\frac{14}{16}$ to lowest terms by extracting and canceling out 2.

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

| Compare $\frac{7}{8}$ and $\frac{7}{8}$.

True

Exam Papers Practice

Question 6

(a) Find the value of x when $\dfrac{18}{24} = \dfrac{27}{x}$.   **Answer**   [1]

x = 6

x = -6

(b) Show that $\dfrac{2}{3} \div 1\dfrac{1}{6} = \dfrac{4}{7}$.

[2]

Write down all the steps in your working.

$\dfrac{2}{3} \div 1\dfrac{1}{6} = \dfrac{4}{7}$

Divide $\frac{2}{3}$ by $\frac{1\times 6+1}{6}$ by multiplying $\frac{2}{3}$ by the reciprocal of $\frac{1\times 6+1}{6}$.

$\dfrac{2 \times 6}{3\left(1 \times 6 + 1\right)} = \dfrac{4}{7}$

Cancel out 3 in both numerator and denominator.

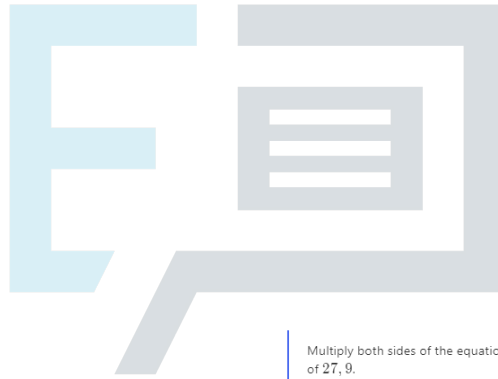$\dfrac{2 \times 2}{1 + 6} = \dfrac{4}{7}$

Multiply 2 and 2 to get 4.

$\dfrac{4}{1 + 6} = \dfrac{4}{7}$

Add 1 and 6 to get 7.

$\dfrac{4}{7} = \dfrac{4}{7}$

Compare $\frac{4}{7}$ and $\frac{4}{7}$.

True

Question 7

Show that $\dfrac{7}{27} + 1\dfrac{7}{9} = 2\dfrac{1}{27}$.

[2]

Write down all the steps in your working.

Multiply both sides of the equation by 27, the least common multiple of $27, 9$.

$7 + 3\left(1 \times 9 + 7\right) = 2 \times 27 + 1$

Multiply 1 and 9 to get 9.

$7 + 3\left(9 + 7\right) = 2 \times 27 + 1$

Add 9 and 7 to get 16.

$7 + 3 \times 16 = 2 \times 27 + 1$

Multiply 3 and 16 to get 48.

$7 + 48 = 2 \times 27 + 1$

Add 7 and 48 to get 55.

$55 = 2 \times 27 + 1$

Multiply 2 and 27 to get 54.

$55 = 54 + 1$

Add 54 and 1 to get 55.

$55 = 55$

Compare 55 and 55.

True

Question 8

Write down the number which is 3.6 less than – 4.7 .

[1]

Answer

-8.3

Question 9

Show that $3\dfrac{3}{4} + 1\dfrac{1}{3} = 5\dfrac{1}{12}$.

Write down all the steps in your working.

[2]

Answer

3(3×4+3)+4(1×3+1)=5×12+1
3(12+3)+4(1×3+1)=5×12+1
3×15+4(1×3+1)=5×12+1
45+4(1×3+1)=5×12+1
45+4(3+1)=5×12+1
45+4×4=5×12+1
45+16=5×12+1
61=5×12+1
61=60+1
61=61

Question 10

Write as a single fraction $\dfrac{3a}{8} + \dfrac{4}{5}$.

[2]

$$\dfrac{15a+32}{40}$$

Question 11

(a) Find the value of x.

$$\frac{2}{3} + \frac{5}{6} = \frac{x}{2}.$$

Answer [1]

x=3

(b) Find the value of y.

$$\frac{5}{3} \div \frac{3}{y} = \frac{40}{9}.$$

Answer [1]

y=8

Question 12

Without using your calculator, work out the following.
Show all the steps of your working and give each answer as a fraction in its simplest form.

(a) $\dfrac{11}{12} - \dfrac{1}{3}$

$$\frac{11}{12} - \frac{i}{3}$$

[2]

Divide i by 3 to get $\frac{1}{3}i$.

$$Re\left(\frac{11}{12} - \frac{1}{3}i\right)$$

The real part of $\frac{11}{12} - \frac{1}{3}i$ is $\frac{11}{12}$.

$$\frac{11}{12}$$

(b) $\dfrac{1}{4} \div \dfrac{11}{13}$

[2]

Divide $\frac{1}{4}$ by $\frac{11}{13}$ by multiplying $\frac{1}{4}$ by the reciprocal of $\frac{11}{13}$.

$$\frac{1}{4} \times \left(\frac{13}{11}\right)$$

Multiply $\frac{1}{4}$ times $\frac{13}{11}$ by multiplying numerator times numerator and denominator times denominator.

$$\frac{1 \times 13}{4 \times 11}$$

Do the multiplications in the fraction $\frac{1\times13}{4\times11}$.

$$\frac{13}{44}$$

Question 13

Without using a calculator, work out $1\frac{2}{3} - \frac{11}{15}$.
Write down all the steps of your working and give your answer as a fraction in its lowest terms. [3]

Multiply 1 and 3 to get 3.

$$\frac{3+2}{3} - \frac{11}{15}$$

Add 3 and 2 to get 5.

$$\frac{5}{3} - \frac{11}{15}$$

Least common multiple of 3 and 15 is 15. Convert $\frac{5}{3}$ and $\frac{11}{15}$ to fractions with denominator 15.

$$\frac{25}{15} - \frac{11}{15}$$

Since $\frac{25}{15}$ and $\frac{11}{15}$ have the same denominator, subtract them by subtracting their numerators.

$$\frac{25 - 11}{15}$$

Question 14

(a) Write $\frac{11}{3}$ as a mixed number. [1]

Subtract 11 from 25 to get 14.

Answer
≈ 3.666666667

$$\frac{14}{15}$$

(b) **Without using a calculator**, work out $\frac{1}{4} + \frac{5}{12}$

Show all the steps of your working and give your answer as a fraction in its lowest terms. [2]

Least common multiple of 4 and 12 is 12. Convert $\frac{1}{4}$ and $\frac{5}{12}$ to fractions with denominator 12.

$$\frac{3}{12} + \frac{5}{12}$$

Since $\frac{3}{12}$ and $\frac{5}{12}$ have the same denominator, add them by adding their numerators.

$$\frac{3+5}{12}$$

Add 3 and 5 to get 8.

$$\frac{8}{12}$$

Reduce the fraction $\frac{8}{12}$ to lowest terms by extracting and canceling out 4.

$$\frac{2}{3}$$

Question 15

Without using a calculator, work out $1\frac{2}{3} + \frac{5}{7}$. [3]

Write down all the steps of your working and give your answer as a mixed number in its simplest form.

Multiply 1 and 3 to get 3.

$$\frac{3+2}{3} + \frac{5}{7}$$

Add 3 and 2 to get 5.

$$\frac{5}{3} + \frac{5}{7}$$

Least common multiple of 3 and 7 is 21. Convert $\frac{5}{3}$ and $\frac{5}{7}$ to fractions with denominator 21.

$$\frac{35}{21} + \frac{15}{21}$$

Since $\frac{35}{21}$ and $\frac{15}{21}$ have the same denominator, add them by adding their numerators.

$$\frac{35+15}{21}$$

Add 35 and 15 to get 50.

$$\frac{50}{21}$$

3

Question 16

Without using your calculator, work out $\dfrac{11}{12} - \left(\dfrac{3}{4} - \dfrac{2}{3}\right)$.

[4]

You must show all your working and give your answer as a fraction in its simplest form.

Least common multiple of 4 and 3 is 12. Convert $\frac{3}{4}$ and $\frac{2}{3}$ to fractions with denominator 12.

$$\dfrac{11}{12} - \left(\dfrac{9}{12} - \dfrac{8}{12}\right)$$

Since $\frac{9}{12}$ and $\frac{8}{12}$ have the same denominator, subtract them by subtracting their numerators.

$$\dfrac{11}{12} - \dfrac{9-8}{12}$$

Subtract 8 from 9 to get 1.

$$\dfrac{11}{12} - \dfrac{1}{12}$$

Since $\frac{11}{12}$ and $\frac{1}{12}$ have the same denominator, subtract them by subtracting their numerators.

$$\dfrac{11-1}{12}$$

Subtract 1 from 11 to get 10.

$$\dfrac{10}{12}$$

Reduce the fraction $\frac{10}{12}$ to lowest terms by extracting and canceling out 2.

$$\dfrac{5}{6}$$

4

Exam Papers Practice

Question 17

Without using your calculator, work out $3\frac{1}{3} \div 2\frac{1}{2}$.

You must show all your working and give your answer as a mixed number in its simplest form. [3]

$$3\frac{1}{3} \div 2\frac{1}{2}$$

Divide $\frac{3\times3+1}{3}$ by $\frac{2\times2+1}{2}$ by multiplying $\frac{3\times3+1}{3}$ by the reciprocal of $\frac{2\times2+1}{2}$.

$$\frac{(3\times3+1)\times2}{3(2\times2+1)}$$

Multiply 3 and 3 to get 9.

$$\frac{(9+1)\times2}{3(2\times2+1)}$$

Add 9 and 1 to get 10.

$$\frac{10\times2}{3(2\times2+1)}$$

Multiply 10 and 2 to get 20.

$$\frac{20}{3(2\times2+1)}$$

Multiply 2 and 2 to get 4.

$$\frac{20}{3(4+1)}$$

Add 4 and 1 to get 5.

$$\frac{20}{3\times5}$$

Multiply 3 and 5 to get 15.

$$\frac{20}{15}$$

Reduce the fraction $\frac{20}{15}$ to lowest terms by extracting and canceling out 5.

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

Question 18

Without using a calculator, work out $\frac{6}{7} \div 1\frac{2}{3}$.

Show all your working and give your answer as a fraction in its lowest terms. [3]

$$\frac{6}{7} \div 1\frac{2}{3}$$

Divide $\frac{6}{7}$ by $\frac{1\times3+2}{3}$ by multiplying $\frac{6}{7}$ by the reciprocal of $\frac{1\times3+2}{3}$.

$$\frac{6\times3}{7(1\times3+2)}$$

Multiply 6 and 3 to get 18.

$$\frac{18}{7(1\times3+2)}$$

Multiply 1 and 3 to get 3.

$$\frac{18}{7(3+2)}$$

Add 3 and 2 to get 5.

$$\frac{18}{7\times5}$$

Multiply 7 and 5 to get 35.

$$\frac{18}{35}$$

Exam Papers Practice

Question 19

Without using a calculator, show that $\left(\dfrac{49}{16}\right)^{-\frac{3}{2}} = \dfrac{64}{343}$.

[2]

Write down all the steps in your working.

$$\left(\dfrac{49}{16}\right)^{-\frac{3}{2}} = \dfrac{64}{343}$$

Calculate $\frac{49}{16}$ to the power of $-\frac{3}{2}$ and get $\frac{64}{343}$.

$$\dfrac{64}{343} = \dfrac{64}{343}$$

Compare $\frac{64}{343}$ and $\frac{64}{343}$.

True

Question 20

[3]

Write $\dfrac{1}{c} + \dfrac{1}{d} - \dfrac{c-d}{cd}$ as a single fraction in its simplest form.

$$\dfrac{2}{c}$$

Exam Papers Practice

Question 21

Work out the value of $1 + \dfrac{2}{3 + \dfrac{4}{5+6}}$.

[2]

Answer

$$\frac{59}{37} \approx 1.594594595$$

Question 22

$\dfrac{4c}{5} - \dfrac{3c}{35} = \dfrac{10}{7}$.   Find c.

[2]

Answer

c = 2

Question 36

Without using a calculator, work out $\dfrac{5}{6} - \dfrac{1}{2}$
.

Show all the steps of your working and give your answer as a fraction in its simplest form.   [2]

$$\frac{5}{6} - \frac{1}{2}$$

Least common multiple of 6 and 2 is 6. Convert $\frac{5}{6}$ and $\frac{1}{2}$ to fractions with denominator 6.

$$\frac{5}{6} - \frac{3}{6}$$

Since $\frac{5}{6}$ and $\frac{3}{6}$ have the same denominator, subtract them by subtracting their numerators.

$$\frac{5 - 3}{6}$$

Subtract 3 from 5 to get 2.

$$\frac{2}{6}$$ [2]

Reduce the fraction $\frac{2}{6}$ to lowest terms by extracting and canceling out 2.

$$\frac{1}{3}$$

Question 37

Work out $\dfrac{2}{3} - \dfrac{1}{4}$, giving your answer as a fraction in its lowest terms.

Do not use a calculator and show all the steps of your working.

$$\frac{2}{3} - \frac{1}{4}$$

Least common multiple of 3 and 4 is 12. Convert $\frac{2}{3}$ and $\frac{1}{4}$ to fractions with denominator 12.

$$\frac{8}{12} - \frac{3}{12}$$

Since $\frac{8}{12}$ and $\frac{3}{12}$ have the same denominator, subtract them by subtracting their numerators.

$$\frac{8 - 3}{12}$$

Subtract 3 from 8 to get 5.

$$\frac{5}{12}$$

2

Question 38

Without using your calculator, work out $\dfrac{3}{4} + \dfrac{2}{3} - \dfrac{1}{8}$.

You must show all your working and give your answer as a mixed number in its simplest form. [4]

$$\frac{3}{4} + \frac{2}{3} - \frac{1}{8}$$

| Least common multiple of 4 and 3 is 12. Convert $\frac{3}{4}$ and $\frac{2}{3}$ to fractions with denominator 12.

$$\frac{9}{12} + \frac{8}{12} - \frac{1}{8}$$

| Since $\frac{9}{12}$ and $\frac{8}{12}$ have the same denominator, add them by adding their numerators.

$$\frac{9 + 8}{12} - \frac{1}{8}$$

| Add 9 and 8 to get 17.

$$\frac{17}{12} - \frac{1}{8}$$

| Least common multiple of 12 and 8 is 24. Convert $\frac{17}{12}$ and $\frac{1}{8}$ to fractions with denominator 24.

$$\frac{34}{24} - \frac{3}{24}$$

| Since $\frac{34}{24}$ and $\frac{3}{24}$ have the same denominator, subtract them by subtracting their numerators.

$$\frac{34 - 3}{24}$$

| Subtract 3 from 34 to get 31.

$$\frac{31}{24}$$

Question 39

Without using a calculator, work out $\dfrac{3}{5} + \dfrac{1}{6}$. [2]
Write down all the steps of your working and give your answer as a fraction in its simplest form.

$$\frac{3}{5} + \frac{1}{6}$$

| Least common multiple of 5 and 6 is 30. Convert $\frac{3}{5}$ and $\frac{1}{6}$ to fractions with denominator 30.

$$\frac{18}{30} + \frac{5}{30}$$

| Since $\frac{18}{30}$ and $\frac{5}{30}$ have the same denominator, add them by adding their numerators.

$$\frac{18 + 5}{30}$$

| Add 18 and 5 to get 23.

$$\frac{23}{30}$$

Question 40

Without using a calculator, work out $2\frac{5}{8} \times \frac{3}{7}$.

Show all your working and give your answer as a mixed number in its lowest terms. [3]

Multiply 2 and 8 to get 16.

$$\frac{16+5}{8} \times \left(\frac{3}{7}\right)$$

Add 16 and 5 to get 21.

$$\frac{21}{8} \times \left(\frac{3}{7}\right)$$

Multiply $\frac{21}{8}$ times $\frac{3}{7}$ by multiplying numerator times numerator and denominator times denominator.

$$\frac{21 \times 3}{8 \times 7}$$

Do the multiplications in the fraction $\frac{21 \times 3}{8 \times 7}$.

$$\frac{63}{56}$$

Reduce the fraction $\frac{63}{56}$ to lowest terms by extracting and canceling out 7.

$$\frac{9}{8}$$

Question 41

Without using a calculator, work out $\frac{1}{12} \times 1\frac{1}{5}$.

Show all your working and give your answer as a fraction in its lowest terms. [2]

Multiply 1 and 5 to get 5.

$$\frac{1}{12} \times \left(\frac{5+1}{5}\right)$$

Add 5 and 1 to get 6.

$$\frac{1}{12} \times \left(\frac{6}{5}\right)$$

Multiply $\frac{1}{12}$ times $\frac{6}{5}$ by multiplying numerator times numerator and denominator times denominator.

$$\frac{1 \times 6}{12 \times 5}$$

Do the multiplications in the fraction $\frac{1 \times 6}{12 \times 5}$.

$$\frac{6}{60}$$

Reduce the fraction $\frac{6}{60}$ to lowest terms by extracting and canceling out 6.

$$\frac{1}{10}$$

4

Question 42

Without using your calculator, work out $1\frac{7}{12}+\frac{13}{20}$.

You must show all your working and give your answer as a mixed number in its simplest form.

[3]

Multiply 1 and 12 to get 12.

$$\frac{12+7}{12}+\frac{13}{20}$$

Add 12 and 7 to get 19.

$$\frac{19}{12}+\frac{13}{20}$$

Least common multiple of 12 and 20 is 60. Convert $\frac{19}{12}$ and $\frac{13}{20}$ to fractions with denominator 60.

$$\frac{95}{60}+\frac{39}{60}$$

Since $\frac{95}{60}$ and $\frac{39}{60}$ have the same denominator, add them by adding their numerators.

$$\frac{95+39}{60}$$

Add 95 and 39 to get 134.

$$\frac{134}{60}$$

Reduce the fraction $\frac{134}{60}$ to lowest terms by extracting and canceling out 2.

$$\frac{67}{30}$$

Question 43

Without using your calculator, work out $2\frac{1}{4}-\frac{11}{12}$.

You must show all your working and give your answer as a fraction in its lowest terms.

[3]

Multiply 2 and 4 to get 8.

$$\frac{8+1}{4}-\frac{11}{12}$$

Add 8 and 1 to get 9.

$$\frac{9}{4}-\frac{11}{12}$$

Least common multiple of 4 and 12 is 12. Convert $\frac{9}{4}$ and $\frac{11}{12}$ to fractions with denominator 12.

$$\frac{27}{12}-\frac{11}{12}$$

Since $\frac{27}{12}$ and $\frac{11}{12}$ have the same denominator, subtract them by subtracting their numerators.

$$\frac{27-11}{12}$$

Subtract 11 from 27 to get 16.

$$\frac{16}{12}$$

Reduce the fraction $\frac{16}{12}$ to lowest terms by extracting and canceling out 4.

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

5

Question 44

Calculate $\dfrac{2.07 - 1.89}{5.71 - 3.92}$.   [1]

Answer

$$\frac{18}{179} \approx 0.100558659$$

Question 45

Write the following as single fractions.

(a) $x + \dfrac{x}{2}$ [1]

Answer $\dfrac{3}{2} = 1\frac{1}{2} = 1.5$

(b) $x + \dfrac{2}{x}$ [1]

Answer $\dfrac{x^2 + 2}{x}$

6

Question 46

Work out $\dfrac{2}{3} + \dfrac{1}{6} - \dfrac{1}{4}$, giving your answer as a fraction in its lowest terms.

[3]

Do not use a calculator and show all the steps of your working.

Least common multiple of 3 and 6 is 6. Convert $\frac{2}{3}$ and $\frac{1}{6}$ to fractions with denominator 6.

$$\frac{4}{6} + \frac{1}{6} - \frac{1}{4}$$

Since $\frac{4}{6}$ and $\frac{1}{6}$ have the same denominator, add them by adding their numerators.

$$\frac{4+1}{6} - \frac{1}{4}$$

Add 4 and 1 to get 5.

$$\frac{5}{6} - \frac{1}{4}$$

Least common multiple of 6 and 4 is 12. Convert $\frac{5}{6}$ and $\frac{1}{4}$ to fractions with denominator 12.

$$\frac{10}{12} - \frac{3}{12}$$

Since $\frac{10}{12}$ and $\frac{3}{12}$ have the same denominator, subtract them by subtracting their numerators.

$$\frac{10-3}{12}$$

Subtract 3 from 10 to get 7.

$$\frac{7}{12}$$

Question 47

Without using a calculator, work out $1\frac{4}{5} \div \frac{3}{7}$.

[3]

Show all your working and give your answer as a fraction in its lowest terms.

Divide $\frac{1 \times 5 + 4}{5}$ by $\frac{3}{7}$ by multiplying $\frac{1 \times 5 + 4}{5}$ by the reciprocal of $\frac{3}{7}$.

$$\frac{(1 \times 5 + 4) \times 7}{5 \times 3}$$

Multiply 1 and 5 to get 5.

$$\frac{(5 + 4) \times 7}{5 \times 3}$$

Add 5 and 4 to get 9.

$$\frac{9 \times 7}{5 \times 3}$$

Multiply 9 and 7 to get 63.

$$\frac{63}{5 \times 3}$$

Multiply 5 and 3 to get 15.

$$\frac{63}{15}$$

Reduce the fraction $\frac{63}{15}$ to lowest terms by extracting and canceling out 3.

$$\frac{21}{5}$$

Question 48

Without using a calculator, work out $\dfrac{4}{5} \div 2\dfrac{2}{3}$

Write down all the steps of your working and give your answer as a fraction in its simplest form.

Divide $\frac{4}{5}$ by $\frac{2 \times 3 + 2}{3}$ by multiplying $\frac{4}{5}$ by the reciprocal of $\frac{2 \times 3 + 2}{3}$.

Answer

$$\frac{4 \times 3}{5\,(2 \times 3 + 2)}$$

Multiply 4 and 3 to get 12.

[3]

$$\frac{12}{5\,(2 \times 3 + 2)}$$

Multiply 2 and 3 to get 6.

$$\frac{12}{5\,(6 + 2)}$$

Add 6 and 2 to get 8.

$$\frac{12}{5 \times 8}$$

Multiply 5 and 8 to get 40.

$$\frac{12}{40}$$

Reduce the fraction $\frac{12}{40}$ to lowest terms by extracting and canceling out 4.

$$\frac{3}{10}$$

Question 23

Without using a calculator, work out $\quad 1\frac{7}{8} \div \frac{5}{9}.$

[3]

Show all your working and give your answer as a fraction in its lowest terms.

Divide $\frac{1\times 8+7}{8}$ by $\frac{5}{9}$ by multiplying $\frac{1\times 8+7}{8}$ by the reciprocal of $\frac{5}{9}$.

$$\frac{(1 \times 8 + 7) \times 9}{8 \times 5}$$

Multiply 1 and 8 to get 8.

$$\frac{(8 + 7) \times 9}{8 \times 5}$$

Add 8 and 7 to get 15.

$$\frac{15 \times 9}{8 \times 5}$$

Multiply 15 and 9 to get 135.

$$\frac{135}{8 \times 5}$$

Multiply 8 and 5 to get 40.

$$\frac{135}{40}$$

Reduce the fraction $\frac{135}{40}$ to lowest terms by extracting and canceling out 5.

$$\frac{27}{8}$$

Question 24

Without using your calculator, work out $\quad 2\frac{7}{9} \div \frac{5}{6}.$

[4]

Give your answer as a fraction in its lowest terms.
You must show each step of your working.

Divide $\frac{2\times 9+7}{9}$ by $\frac{5}{6}$ by multiplying $\frac{2\times 9+7}{9}$ by the reciprocal of $\frac{5}{6}$.

$$\frac{(2 \times 9 + 7) \times 6}{9 \times 5}$$

Cancel out 3 in both numerator and denominator.

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

Multiply 2 and 9 to get 18.

$$\frac{2(7 + 18)}{3 \times 5}$$

Add 7 and 18 to get 25.

$$\frac{2 \times 25}{3 \times 5}$$

Multiply 2 and 25 to get 50.

$$\frac{50}{3 \times 5}$$

Multiply 3 and 5 to get 15.

$$\frac{50}{15}$$

Reduce the fraction $\frac{50}{15}$ to lowest terms by extracting and canceling out 5.

$$\frac{10}{3}$$

2

Question 25

Without using a calculator, work out $\frac{1}{4}+\frac{1}{6}$.

Write down all the steps in your working and give your answer as a fraction in its simplest form. [2]

Least common multiple of 4 and 6 is 12. Convert $\frac{1}{4}$ and $\frac{1}{6}$ to fractions with denominator 12.

$$\frac{3}{12} + \frac{2}{12}$$

Since $\frac{3}{12}$ and $\frac{2}{12}$ have the same denominator, add them by adding their numerators.

$$\frac{3+2}{12}$$

Add 3 and 2 to get 5.

$$\frac{5}{12}$$

Question 26

8   **Without using a calculator**, work out $1\frac{1}{6} \div \frac{7}{8}$ [3]

Show all your working and give your answer as a fraction in its lowest terms.

Divide $\frac{1\times6+1}{6}$ by $\frac{7}{8}$ by multiplying $\frac{1\times6+1}{6}$ by the reciprocal of $\frac{7}{8}$.

$$\frac{(1 \times 6 + 1) \times 8}{6 \times 7}$$

Cancel out 2 in both numerator and denominator.

$$\frac{4\,(1+6)}{3 \times 7}$$

Add 1 and 6 to get 7.

$$\frac{4 \times 7}{3 \times 7}$$

Multiply 4 and 7 to get 28.

$$\frac{28}{3 \times 7}$$

Multiply 3 and 7 to get 21.

$$\frac{28}{21}$$

Reduce the fraction $\frac{28}{21}$ to lowest terms by extracting and canceling out 7.

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

Question 27

Without using your calculator, work out $\frac{5}{6} - \left(\frac{1}{2} \times 1\frac{1}{2} \right)$. Write down all the steps of your working.

[3]

Multiply 1 and 2 to get 2.

$\frac{5}{6} - \frac{1}{2} \times \left(\frac{2+1}{2} \right)$

Add 2 and 1 to get 3.

$\frac{5}{6} - \frac{1}{2} \times \left(\frac{3}{2} \right)$

Multiply $\frac{1}{2}$ times $\frac{3}{2}$ by multiplying numerator times numerator and denominator times denominator.

$\frac{5}{6} - \frac{1 \times 3}{2 \times 2}$

Do the multiplications in the fraction $\frac{1 \times 3}{2 \times 2}$.

$\frac{5}{6} - \frac{3}{4}$

Least common multiple of 6 and 4 is 12. Convert $\frac{5}{6}$ and $\frac{3}{4}$ to fractions with denominator 12.

$\frac{10}{12} - \frac{9}{12}$

Since $\frac{10}{12}$ and $\frac{9}{12}$ have the same denominator, subtract them by subtracting their numerators.

$\frac{10 - 9}{12}$

Subtract 9 from 10 to get 1.

$\frac{1}{12}$

Question 28

10 Without using a calculator, work out $1\frac{1}{4} - \frac{7}{9}$.

[3]

Write down all the steps in your working.

Multiply 1 and 4 to get 4.

$\frac{4+1}{4} - \frac{7}{9}$

Add 4 and 1 to get 5.

$\frac{5}{4} - \frac{7}{9}$

Least common multiple of 4 and 9 is 36. Convert $\frac{5}{4}$ and $\frac{7}{9}$ to fractions with denominator 36.

$\frac{45}{36} - \frac{28}{36}$

Since $\frac{45}{36}$ and $\frac{28}{36}$ have the same denominator, subtract them by subtracting their numerators.

$\frac{45 - 28}{36}$

Subtract 28 from 45 to get 17.

$\frac{17}{36}$

Question 29

15 **Do not use a calculator in this question and show all the steps of your working.**

Give each answer as a fraction in its lowest terms.

Work out.

(a) $\dfrac{3}{4} - \dfrac{1}{12}$

Least common multiple of 4 and 12 is 12. Convert $\frac{3}{4}$ and $\frac{1}{12}$ to fractions with denominator 12.

$\dfrac{9}{12} - \dfrac{1}{12}$

Since $\frac{9}{12}$ and $\frac{1}{12}$ have the same denominator, subtract them by subtracting their numerators.

$\dfrac{9-1}{12}$

Subtract 1 from 9 to get 8.

$\dfrac{8}{12}$

Reduce the fraction $\frac{8}{12}$ to lowest terms by extracting and canceling out 4.

$\dfrac{2}{3}$

[2]

(b) $2\dfrac{1}{2} \times \dfrac{4}{25}$

Multiply 2 and 2 to get 4.

$\dfrac{4+1}{2} \times \left(\dfrac{4}{25} \right)$

Add 4 and 1 to get 5.

$\dfrac{5}{2} \times \left(\dfrac{4}{25} \right)$

Multiply $\frac{5}{2}$ times $\frac{4}{25}$ by multiplying numerator times numerator and denominator times denominator.

$\dfrac{5 \times 4}{2 \times 25}$

Do the multiplications in the fraction $\frac{5 \times 4}{2 \times 25}$.

$\dfrac{20}{50}$

Reduce the fraction $\frac{20}{50}$ to lowest terms by extracting and canceling out 10.

$\dfrac{2}{5}$

[2]

Question 30

5 Show that $1\dfrac{1}{2} \div \dfrac{3}{16} = 8$.

Do not use a calculator and show all the steps of your working.

[2]

Divide $\frac{1 \times 2 + 1}{2}$ by $\frac{3}{16}$ by multiplying $\frac{1 \times 2 + 1}{2}$ by the reciprocal of $\frac{3}{16}$.

$\dfrac{(1 \times 2 + 1) \times 16}{2 \times 3} = 8$

Cancel out 2 in both numerator and denominator.

$\dfrac{8(1+2)}{3} = 8$

Add 1 and 2 to get 3.

$\dfrac{8 \times 3}{3} = 8$

Multiply 8 and 3 to get 24.

$\dfrac{24}{3} = 8$

Divide 24 by 3 to get 8.

$8 = 8$

Compare 8 and 8.

True

Exam Papers Practice

Question 31

Without using a calculator, work out $\dfrac{6}{7} \div 1\dfrac{2}{3}$.   Write down all the steps in your working.

[3]

Divide $\frac{6}{7}$ by $\frac{1\times3+2}{3}$ by multiplying $\frac{6}{7}$ by the reciprocal of $\frac{1\times3+2}{3}$.

$$\frac{6 \times 3}{7\,(1 \times 3 + 2)}$$

Multiply 6 and 3 to get 18.

$$\frac{18}{7\,(1 \times 3 + 2)}$$

Multiply 1 and 3 to get 3.

$$\frac{18}{7\,(3 + 2)}$$

Add 3 and 2 to get 5.

$$\frac{18}{7 \times 5}$$

Multiply 7 and 5 to get 35.

$$\frac{18}{35}$$

Question 32

Write down all your working to show that the following statement is correct. $\dfrac{1+\dfrac{8}{9}}{2+\dfrac{1}{2}} = \dfrac{34}{45}$ [2]

Convert 1 to fraction $\frac{9}{9}$.

$$\frac{\frac{9}{9} + \frac{8}{9}}{2 + \frac{1}{2}} = \frac{34}{45}$$

Since $\frac{9}{9}$ and $\frac{8}{9}$ have the same denominator, add them by adding their numerators.

$$\frac{\frac{9+8}{9}}{2 + \frac{1}{2}} = \frac{34}{45}$$

Add 9 and 8 to get 17.

$$\frac{\frac{17}{9}}{2 + \frac{1}{2}} = \frac{34}{45}$$

Convert 2 to fraction $\frac{4}{2}$.

$$\frac{\frac{17}{9}}{\frac{4}{2} + \frac{1}{2}} = \frac{34}{45}$$

Since $\frac{4}{2}$ and $\frac{1}{2}$ have the same denominator, add them by adding their numerators.

$$\frac{\frac{17}{9}}{\frac{4+1}{2}} = \frac{34}{45}$$

Add 4 and 1 to get 5.

$$\frac{\frac{17}{9}}{\frac{5}{2}} = \frac{34}{45}$$

Divide $\frac{17}{9}$ by $\frac{5}{2}$ by multiplying $\frac{17}{9}$ by the reciprocal of $\frac{5}{2}$.

$$\frac{17}{9} \times \left(\frac{2}{5}\right) = \frac{34}{45}$$

Multiply $\frac{17}{9}$ times $\frac{2}{5}$ by multiplying numerator times numerator and denominator times denominator.

$$\frac{17 \times 2}{9 \times 5} = \frac{34}{45}$$

Do the multiplications in the fraction $\frac{17\times2}{9\times5}$.

$$\frac{34}{45} = \frac{34}{45}$$

Compare $\frac{34}{45}$ and $\frac{34}{45}$.

True

Question 33

Show that $\left(\dfrac{1}{10}\right)^2 + \left(\dfrac{2}{5}\right)^2 = 0.17.$

[2]

Write down all the steps in your working.

Calculate $\frac{1}{10}$ to the power of 2 and get $\frac{1}{100}$.

$$\frac{1}{100} + \left(\frac{2}{5}\right)^2 = 0.17$$

Calculate $\frac{2}{5}$ to the power of 2 and get $\frac{4}{25}$.

$$\frac{1}{100} + \frac{4}{25} = 0.17$$

Least common multiple of 100 and 25 is 100. Convert $\frac{1}{100}$ and $\frac{4}{25}$ to fractions with denominator 100.

$$\frac{1}{100} + \frac{16}{100} = 0.17$$

Since $\frac{1}{100}$ and $\frac{16}{100}$ have the same denominator, add them by adding their numerators.

$$\frac{1 + 16}{100} = 0.17$$

Add 1 and 16 to get 17.

$$\frac{17}{100} = 0.17$$

Convert decimal number 0.17 to fraction $\frac{17}{100}$.

$$\frac{17}{100} = \frac{17}{100}$$

Compare $\frac{17}{100}$ and $\frac{17}{100}$.

True

Question 34

Without using your calculator, work out $\quad 1\dfrac{5}{6} + \dfrac{9}{10}.$

You must show your working and give your answer as a mixed number in its simplest form.

[3]

Multiply 1 and 6 to get 6.

$$\frac{6 + 5}{6} + \frac{9}{10}$$

Add 6 and 5 to get 11.

$$\frac{11}{6} + \frac{9}{10}$$

Least common multiple of 6 and 10 is 30. Convert $\frac{11}{6}$ and $\frac{9}{10}$ to fractions with denominator 30.

$$\frac{55}{30} + \frac{27}{30}$$

Since $\frac{55}{30}$ and $\frac{27}{30}$ have the same denominator, add them by adding their numerators.

$$\frac{55 + 27}{30}$$

Add 55 and 27 to get 82.

$$\frac{82}{30}$$

Reduce the fraction $\frac{82}{30}$ to lowest terms by extracting and canceling out 2.

$$\frac{41}{15}$$

Question 35

$$1\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \frac{p}{12}$$

Work out the value of p. **Show all your working.**

[2]

Multiply both sides of the equation by 12, the least common multiple of $2, 3, 4, 12$.

$$6\,(1 \times 2 + 1) + 4 + 3 = p$$

Multiply 1 and 2 to get 2.

$$6\,(2 + 1) + 4 + 3 = p$$

Add 2 and 1 to get 3.

$$6 \times 3 + 4 + 3 = p$$

Multiply 6 and 3 to get 18.

$$18 + 4 + 3 = p$$

Add 18 and 4 to get 22.

$$22 + 3 = p$$

Add 22 and 3 to get 25.

$$25 = p$$

Swap sides so that all variable terms are on the left hand side.

$$p = 25$$

8