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6 Mixed operations of fractions

1 1-minute Revision

Common Error

$2\frac{4}{5} \div 1\frac{2}{5} \times \frac{3}{4} = ?$

A. $2\frac{47}{50}$ ✗   Forget to change the divisor to its reciprocal.

B. $2\frac{2}{3}$ ✗   Mistakenly change the multiplier to its reciprocal.

C. $1\frac{1}{2}$ ✓

D. $\frac{3}{8}$ ✗   Mistakenly change the dividend to its reciprocal and multiplied by $1\frac{2}{5}$.

2 Basic Practice

Do the calculations. (Express the answers as fractions in the simplest forms.)

1. $\frac{7}{12} \times \frac{8}{21} \div \frac{4}{15} =$ _____

2. $3 - \frac{5}{16} \times 2\frac{2}{3} =$ _____

3. $1\frac{2}{3} \div \frac{7}{9} \times \frac{8}{15} =$ _____

4. $(\frac{5}{8} + \frac{1}{6}) \times 1\frac{5}{7} =$ _____

5. $(1\frac{1}{5} - \frac{3}{8}) \div \frac{11}{18} =$ _____

6. $\frac{9}{14} \div (2 - \frac{2}{7}) =$ _____

7. $\frac{1}{6} + 5 \div 3\frac{3}{4} =$ _____

8. $2\frac{4}{7} \times \frac{5}{9} - \frac{13}{14} =$ _____

9. $6\frac{4}{5} \div (\frac{3}{10} + \frac{5}{6}) =$ _____

10. $\frac{7}{16} \div \frac{3}{10} - \frac{3}{4} =$ _____

Blacken the ◯ next to the correct answer.

11. There were 18 litres of distilled water in a company. After $\frac{2}{7}$ of the distilled water was drunk, how many litres of distilled water were left?

◯ A. $18 \times (1 - \frac{2}{7})$ ◯ B. $18 \times \frac{2}{7}$ ◯ C. $18 - \frac{2}{7}$ ◯ D. $18 \div \frac{2}{7}$

12. Janet pays \$64 for $1\frac{1}{2}$ kg of watermelon. Sandy buys $2\frac{1}{4}$ kg of watermelon, how much should she pay?

◯ A. $64 \times 2\frac{1}{4}$

◯ B. $64 \div 1\frac{1}{2} \times 2\frac{1}{4}$

◯ C. $64 \times 1\frac{1}{2} \div 2\frac{1}{4}$

◯ D. $64 \times 1\frac{1}{2} \times 2\frac{1}{4}$

13. A fruit shop sold 192 pieces of fruit yesterday. The number sold today was $1\frac{3}{8}$ times that of yesterday. How many pieces did the fruit shop sell in these two days in total?

○ A. $192 \times 1\frac{3}{8}$

○ B. $(192 + 192) \times 1\frac{3}{8}$

○ C. $192 \div 1\frac{3}{8}$

○ D. $192 \times (1 + 1\frac{3}{8})$

3 Advanced Practice

Fill in the blanks. (Express the answers as whole numbers or fractions in the simplest forms.)

14. a. A bottle of vitamin pills had 60 pills. Dad took $\frac{5}{12}$ of them. Mum took $\frac{5}{12}$ of them. How many vitamin pills did they take in total?

Answer: _____

> **Useful Tips**
> Take the remaining number as the numerator and take the original number as the denominator.

b. What fraction of the original number of vitamin pills are the remaining pills?

Answer: _____

15. Eric weighs $45\frac{3}{10}$ kg. His weight is $1\frac{1}{2}$ times that of Judy. Eric is _____ kg heavier than Judy.

16. If $5\frac{1}{7} - ✱ - ✱ = 0$, the value of ✱ is _____.

Solve the problems. (Show your working; express the answers as whole numbers or fractions in the simplest forms.)

17. Ken has $18\frac{3}{4}$ L of water. He pours $\frac{2}{5}$ of the water into boxes of capacity $\frac{1}{4}$ L. How many boxes can be completely filled?

18. Fanny exercised for $1\frac{1}{4}$ hours on the 1st day. Every day she exercised $\frac{1}{6}$ hour more than the previous day. For how many hours did she exercise on the 6th day?

> **Useful Tips**
> She spent $\frac{1}{6}$ hour more on the 2nd day. Then, how many $\frac{1}{6}$ hour more was spent on the 6th day?

Final Assessment

Time allowed: **45**min

Name: _____ Class: _____ ( ) Date: _____

| Assessment points		Questions	Marks
Circles	Recognising circles, and drawing circles	1 – 4	/ 14
Division of fractions	Division of fractions, and mixed operations of fractions	5 – 11	/ 16
3-D shapes	Cross sections, vertices and edges, and cubes, cuboids, cylinders and spheres	12 – 19	/ 16
Multiplication of decimals	Interesting multiplication, and multiplication of decimals	20 – 30	/ 22
Volumes	Recognising volumes, and volumes of cuboids, cubes and 3-D shapes	31 – 38	/ 19
Simple equations	Solve simple equations and related problems	39 – 43	/ 13
		Total marks:	**/ 100**

Instructions
- **Multiple choice questions:** Blacken the ◯ next to the correct answer.
- **Questions in which you are asked to 'show your working':**
  Write your mathematical expressions, answers, and statements / conclusions.
- **Other types of questions:** Answer as required in the spaces provided.

Marks

1. In the figure on the right, point O is the centre. AC is a straight line.

   a. Line segment _____ is the longest straight line inside the circle.

   2M

   b. If OA is 3 cm, then OD is _____ cm.

   2M
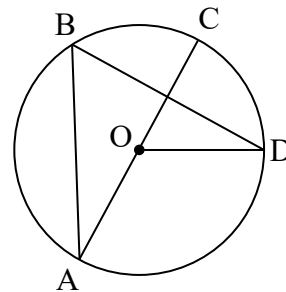
2. In the figure on the right, the centres of the small circle and the big circle are point P and point Q respectively. RS and TU are straight lines.

   a. If the radius of the small circle is 2 cm, then PU is _____ cm.

   2M

   b. If RS is 4 cm, then the diameter of the big circle is _____ cm.

   2M

3. The figure on the right is made up of 4 identical circles. By joining the centres, a square is formed. If the radius of the circle is 3 cm, the area of the square is _____ cm².
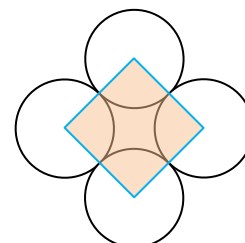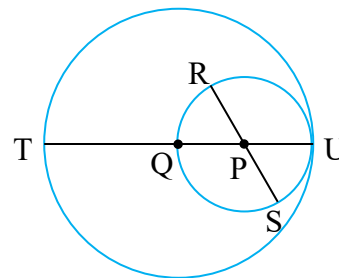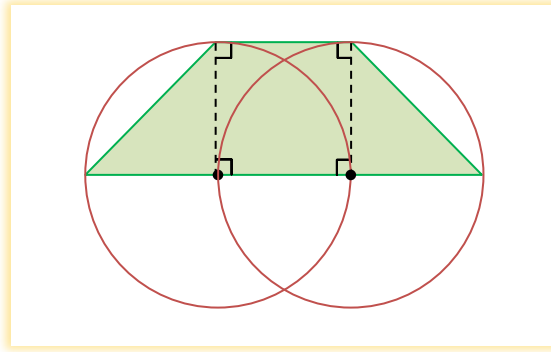
   2M

Cross-topic Exercise

Complete the following.

1. The figure below is made up of 2 circles of the same size. The diameter of each circle is 8 cm. '•' is the centre of each circle. The green part is a trapezium.

   a. The trapezium can be divided into 2 _____ triangles and (1 / 2 / 3) _____ square. (Circle the answer)

   b. The area of the green part is _____ cm^2.

2.

   a. Each potato costs $_____ on average. (Write the algebraic expression.)

   b. Mum buys 12 beetroots. She only needs to pay $_____.

   c. Mum mixes the water shown on the right with beetroot juice of $1\frac{1}{5}$ L. Then, she divides the beetroot juice into cups of $\frac{3}{10}$ L. There are _____ cups of beetroot juice.
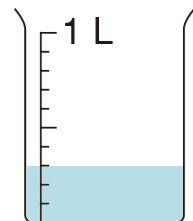
3. Each metal rod weighs 1.8 kg. Each rubber pellet joining the metal rods weighs 0.75 kg. If you use metal rods and rubber pellets to make a tent on the right, the whole framework will weighs _____ kg.

Revision Notes
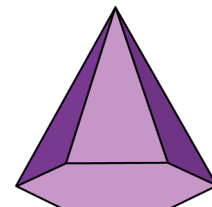
Unit 1: Circles (Exercises 1-2)

1. Recognising the circumference, centre, radius and diameter of a circle

- The perimeter of the circle is called the circumference.
- Point O is the centre. All the points on the circumference are equally distant from the centre.
- OP, OQ and OR are radii of the circle.
- PR is a diameter of the circle.

2. Drawing circles

Needle → ← Pencil tip
Radius
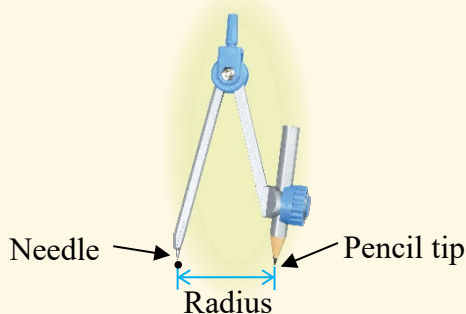
- The point where the needle is fixed is the centre.
- The distance between the needle and the pencil tip is the radius of the circle.
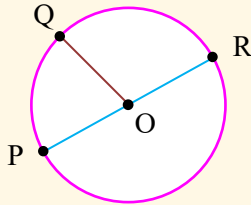- By rotating the pencil tip for one loop on a piece of paper, a circle will be drawn.

Unit 2: Division of fractions (Exercises 3-6)

1. Fraction and division

- A whole number divided by a whole number can be represented by a fraction.

Whole number A (Dividend) ÷ Whole number B (Divisor) = $\dfrac{\text{Whole number A}}{\text{Whole number B}}$

e.g.: $3 \div 6 = \dfrac{3}{6} = \dfrac{1}{2}$

- Ratio of two numbers

Express the ratio of two whole numbers as a fraction.

e.g.: There are 5 objects in Group A. There are 7 objects in Group B.

The number of objects in Group A is $5 \div 7 = \dfrac{5}{7}$ that of Group B.

12. $6 \div \dfrac{2}{5} \div 3$

$= 6 \times \dfrac{5}{2} \times \dfrac{1}{3}$

$= 5$

Each person can get 5 bottles of soya milk.

13. $3 \div \dfrac{3}{4}$

$= 3 \times \dfrac{4}{3}$

$= 4$

The blue ribbon is 4 m.

14. $4\dfrac{1}{2} \div 3 \div 2$

$= \dfrac{9}{2} \times \dfrac{1}{3} \times \dfrac{1}{2}$

$= \dfrac{3}{4}$

Each one can get $\dfrac{3}{4}$ L of orange juice on average.

15. $2\dfrac{700}{1000} \div \dfrac{3}{5}$

$= 2\dfrac{7}{10} \div \dfrac{3}{5}$

$= \dfrac{27}{10} \times \dfrac{5}{3}$

$= \dfrac{9}{2}$

$= 4\dfrac{1}{2}$

4 cakes can be made at most.

[Convert all the weights into the same unit first.

$700 \text{ g} = \dfrac{700}{1000} \text{ kg}$.]

6 Mixed operations of fractions

(The result of calculations can be expressed as mixed numbers or improper fractions in the simplest forms.)

1. $\dfrac{5}{6}$

2. $2\dfrac{1}{6}$

3. $\dfrac{8}{7}$ (or $1\dfrac{1}{7}$)

4. $\dfrac{19}{14}$ (or $1\dfrac{5}{14}$)

5. $\dfrac{27}{20}$ (or $1\dfrac{7}{20}$)

6. $\dfrac{3}{8}$

7. $\dfrac{3}{2}$ (or $1\dfrac{1}{2}$)

8. $\dfrac{1}{2}$

9. 6

10. $\dfrac{17}{24}$

11. A

[$\dfrac{2}{7}$ of the distilled water was drunk. $(1 - \dfrac{2}{7})$ of the distilled water was left.

Distilled water left = Original amount × Fraction of the original amount that the remaining distilled water accounts for = $18 \times (1 - \dfrac{2}{7})$]

MCQ Explanation

Wrong choice	Reason
B	Neglect that the question is asking for the amount of distilled water left. Mistakenly choose an expression to find the amount of distilled water drunk.
C	Mix up '$\dfrac{2}{7}$ of the distilled water' and '$\dfrac{2}{7}$ L' and think that $\dfrac{2}{7}$ is referring to $\dfrac{2}{7}$ L. Therefore, wrongly use subtraction for calculation.
D	Misunderstand the question. Wrongly use division for calculation.

12. B

[To find how much Sandy should pay, we should find the price of every kilogram of watermelon first.

Given that \$64 can buy $1\dfrac{1}{2}$ kg, then each kilogram costs \$$(64 \div 1\dfrac{1}{2})$. By multiplying the weight of watermelon that Sandy buys $(2\dfrac{1}{4}$ kg) by the price per each kilogram, we can find out how much she should pay.]

MCQ Explanation

Wrong choice	Reason
A	Mistakenly think that $64 is the price of 1 kg of watermelon.
C	Mix up the concept of multiplication and division. Mistakenly reverse the multiplication and division.
D	Mistakenly think that $64 \times 1\frac{1}{2}$ can find the price of every kilogram of watermelon.

13. D

[The fruit sold today was $1\frac{3}{8}$ times that of yesterday.

The fruit sold yesterday was 1 times 192. Therefore, the number of pieces of fruit sold in these two days

was $192 \times (1 + 1\frac{3}{8})$.]

MCQ Explanation

Wrong choice	Reason
A	Calculate the number of pieces of fruit sold today only.
B	Put the brackets in the inappropriate place, so a wrong answer will be calculated.
C	Mistakenly think that the question is asking for the amount of fruit sold today and wrongly use division to solve the problem.

14. a. 50   [$60 \times (\frac{5}{12} + \frac{5}{12})$ or $60 \times \frac{5}{12} \times 2$]

> **Common mistake:** $10\frac{5}{12}$ ✗
>
> - Misunderstand 'Mum takes $\frac{5}{12}$ of them'. Mum takes $\frac{5}{12}$ of the original 60 pills, but not $\frac{5}{12}$ of the pills left by Dad. Therefore, the expression $60 \times \frac{5}{12} \times \frac{5}{12}$ does not catch the meaning of the question.

b. $\frac{1}{6}$

[They take 50 pills in total. There are $60 - 50 = 10$ remaining pills. Therefore, the 10 remaining pills account for $\frac{10}{60}$, that is $\frac{1}{6}$, of the 60 original pills.]

15. $\frac{151}{10}$ (or $15\frac{1}{10}$)

[Eric is heavier than Judy.

Weight of Eric – Weight of Judy =

$45\frac{3}{10} - (45\frac{3}{10} \div 1\frac{1}{2})$]

16. $\frac{18}{7}$ (or $2\frac{4}{7}$)

[$5\frac{1}{7}$ minus 2 ✱ is equal to 0, that means $5\frac{1}{7}$ is equal to

2 ✱. By dividing $5\frac{1}{7}$ by 2, the value of ✱ can be

found. That is, $5\frac{1}{7} \div 2 = \frac{18}{7}$.]

17. $18\frac{3}{4} \times \frac{2}{5} \div \frac{1}{4}$

$= \frac{75}{4} \times \frac{2}{5} \times 4$

$= 30$

30 boxes can be completely filled.

18. $1\frac{1}{4} + \frac{1}{6} \times 5$

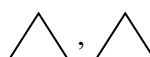$= \frac{5}{4} + \frac{5}{6}$

$= 2\frac{1}{12}$

She spent $2\frac{1}{12}$ hours doing exercise on the 6th day.

[The 2nd day was $\frac{1}{6}$ hour more than the 1st day, so

add $\frac{1}{6}$ for the 2nd day. The 3rd day was $\frac{1}{6}$ hour more

than the 2nd day, so add $\frac{1}{6} \times 2$ for the 3rd day. The

4th day was $\frac{1}{6}$ hour more than the 3rd day, so add

$\frac{1}{6} \times 3$ for the 4th day, so add $(\frac{1}{6} \times 5)$ hour for the 6th

day.]

7 Cross sections of 3-D shapes

1. ◯ , ◯   (Answers are for reference only)

[The size and shape of the base and cross section should be the same.]

2. △ , △   (Answers are for reference only)

[The size and shape of the base and cross section should be the same.]