National 5 Portfolio

N5

Applications 1.3 – Fractions and Percentages

Section A - Revision

This section will help you revise previous learning which is required in this topic.

R1   I can perform calculations involving fractions without a calculator

1.   Perform the following calculations without a calculator, expressing your answer in its simplest form:

   (a) $\dfrac{5}{12} + \dfrac{3}{12}$ (b) $\dfrac{1}{5} + \dfrac{1}{8}$ (c) $\dfrac{8}{15} - \dfrac{2}{15}$ (d) $\dfrac{2}{3} - \dfrac{5}{8}$

2.   Perform the following calculations without a calculator, expressing your answer in its simplest form:

   (a) $\dfrac{7}{8} \times \dfrac{16}{21}$ (b) $\dfrac{6}{7} \times \dfrac{2}{3}$ (c) $\dfrac{2}{5} \div \dfrac{3}{4}$ (d) $\dfrac{8}{15} \div \dfrac{9}{20}$

3.   Perform the following calculations without a calculator, expressing your answer in its simplest form:

   (a) $3\dfrac{1}{3} + 2$ (b) $4\dfrac{8}{9} + 3\dfrac{3}{4}$ (c) $3\dfrac{3}{4} - 1$ (d) $6\dfrac{4}{5} - 2\dfrac{3}{10}$

   (e) $1\dfrac{1}{2} \times 3$ (f) $3\dfrac{3}{5} \times 2\dfrac{1}{12}$ (g) $2\dfrac{1}{2} \div 5$ (h) $9\dfrac{3}{4} \div 8\dfrac{1}{8}$

R2   I can convert between fractions, decimals and percentages.

1.   Write each of these percentages as

   (i)   an equivalent decimal fraction

   (ii)   an equivalent vulgar fraction in its simplest form

   (a) 10%   (b) 80%   (c) 35%   (d) 12%

   (e) 44%   (f) $66\dfrac{2}{3}\%$ (g) 25%   (h) 77%

Fractions and Percentages

2. Write each of these vulgar fractions as

(i) an equivalent decimal fraction

(ii) an equivalent percentage

(a) $\frac{27}{100}$ (b) $\frac{3}{50}$ (c) $\frac{4}{5}$ (d) $\frac{7}{10}$

(e) $\frac{9}{20}$ (f) $\frac{1}{3}$ (g) $\frac{3}{5}$ (h) $\frac{3}{10}$

3. Write each percentage increase or decrease as a single percentage

(i) example a 10% increase is equivalent to 110%.

(ii) example a 10% decrease is equivalent to 90%.

(a) 20% increase   (b) 60% decrease   (c) 25% increase

(d) 35% decrease   (e) 12% decrease   (f) 18% increase

(g) 5% decrease   (h) 8% increase   (i) 3% decrease

Fractions and Percentages

Section B - Assessment Standard Section

This section will help you practise for your Assessment Standard Test for Fractions and Percentages. (Applications 1.3)

1.   Ross bought a new motorbike for £16 000. Its value decreased by 8% each year. Find the value of the motorbike after 2 years.

2.   Declan bought a new watch for £2 000. Its value increased by 6% each year. Find the value of the watch after 5 years.

3.   Clare measures the length and breadth of a table top as shown in the diagram below.

(a) $2\frac{3}{5}$ m   (b) $3\frac{1}{5}$ m

$1\frac{1}{4}$ m

$4\frac{2}{3}$ m
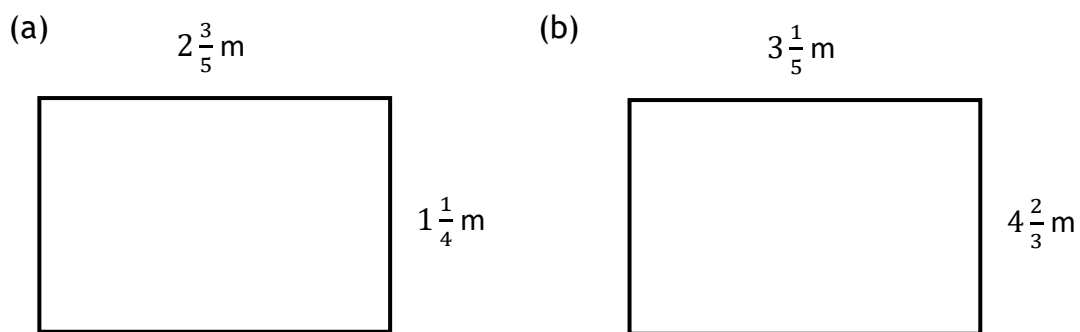
(i) Calculate the exact area of each table top (in m^2).
(ii) Calculate the exact perimeter of each table top.

*(**Note**: even when using a calculator to obtain the answer, all appropriate working must be shown to display your understanding and receive all marks)*

4.   A trainee in a garden centre monitors the growth of young plants.

(a)   The height of the plant a found to increase by 12% to 40 cm.

Find the height of the plant when the trainee started to monitor it.

(b)   The height of another plant is found to decrease by 6% to 37 cm.

Find the height of this plant when the trainee started to monitor it.

Fractions and Percentages

Section C – Operational Skills Section

This section provides problems with the operational skills associated with Fractions and decimals.

O1	I can find an initial quantity given the final value and percentage increase/decrease (backward percentages).

1. Kerry bought a car in 2006.

   When she sold it four years later, she found that it had reduced in value by 60% and she received only £4640.

   How much had Kerry paid for the car in 2006?

2. Tony's train fare has just gone up by 10%. His new fare is £3.85.

   What was Tony's train fare before the price increase?

3. A computer is sold for £632.50. This price includes VAT at 20%.

   Calculate the price of the computer without VAT.

4. James bought a car last year. It has lost 12.5% of its value since then. It is now valued at £14875.

   How much did James pay for his car?

5. After a 10% pay rise Louise's wage for her full time job went up to £44000.

   What was her pay before her rise?

6. In a sale, all cameras are reduced by 20%.

   A camera now costs £45.

   Calculate the original cost of the camera.

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7. Due to poor support a season ticket for East Kilbride United has reduced its season tick price to £400.

If this was a 20% reduction on the cost of last year's season ticket, what was the cost of last year's season ticket?

8. Mark takes some friend out for a meal.

The restaurant adds 10% servise charge to the price of the meal.

The total bill is £148·50.

What was the pice of the meal?

9. A car is valued at £3780.

This is 16% less than lasy tear's value.

What was the value of the car last year?

10. The price for Paul's summer holiday is £894·40.

The price includes a 4% booking fee.

What is the price of his holiday without the b ooking fee?

11. This year, Bewn paid £260 for his car insurance.

This is an increase of 30% on last year's payment.

How much did Ben pay last year?

Fractions and Percentages

O2	I can calculate a final value given a series of different percentage increase/decrease.

1. A new luxury villa in Florida is valued at $375000. It is expected to rise in value by 15% during its first year and 20% during its second year.

   What will the value of the villa be after 2 years?

2. Mr Dodds buys a Honda Civic Type R for £25000. It depreciates in value by 12% during its first year and 8.5% during its second year and 3% in its third year.

   How much will Mr Dodds car be worth after 3 years?

3. Jorge buys a new house for £80 000. The value of the house depreciates by 8% in the first year.

   However it appreciates by 14% in the second year. How much would his house be worth at the end of the second year?

4. Company shares worth £1,200 depreciate in value over a month by 12%, but they then appreciate in value by 13% over the next month.

   Are the shares now worth more or less than they were originally?

   Justify your answer with full working.

5. The Pollards bought a bungalow for £110,000.

   It appreciated in value for the next three years by 8% in year 1, by 6·5% in year 2 and by 5% in year 3.

   How much was the bungalow worth after 3 years?

Fractions and Percentages

O3 **I can calculate a final value given a series of constant percentage increase/decrease (recurring percentages).**

1. Patrick buys £1400 of bonds which have a guaranteed return on investment of 5·3% per annum compounded for 4 years.

   How much will the bonds be worth at the end of the fourth year?

2. Katie invested £550 on the stock exchange.

   However her investment was not a good one and her shares lost 8% of their value every year for three years.

   How much was her investment worth at the end of the third year?

3. Calculate the compound interest on £5600 for 10 years at 6% p.a.

4. Mrs Black deposits £600 in a bank and leaves it there for three years to gain compound interest at 5% per annum.

   Calculate how much is in her account after 3 years?

5. There are 2·69 million vehicles in Scotland.

   It is estimated that this number will increase at a rate of 4% each year.

   If this estimate is correct, how many vehicles will there be in 3 years' time?

   Give your answer **correct to 3 significant figures.**

6. Ian's annual salary is £28 400. His boss tells him his salary will increase by 2·3% per annum.

   What will Ian's salary be after 3 years?

Fractions and Percentages

7. An industrial machine cost £176 500.

Its value depreciates by $4 \cdot 25\%$ each year.

How much is it worth after 3 years?

Give your answer correct to three significant figures.

8. Calcualte the compound interest earned when £50 000 is invested for 4 years at $4 \cdot 5\%$ per annum.

9. It is estimated that house prices will increase at the rate of $3 \cdot 15\%$ per annum.

A house is valued at £134 750. If its value increases at the predicted rate, calculate its value after 3 years.

Give your answer to four significant figures.

10. Olga normally runs a total distance of 28 miles per week.

She decides to increase her distance by 10% a week for the next four weeks.

How many miles will she run in the fourth week?

11. It is estimated that an iceberg weighs 84 000 tonnes.

As the iceberg moves into warmer water, its weight decreases by 25% each day.

What will the iceberg weigh after 3 days in the warmer water?

Give your answer to 3 significant figures.

12. Alistair buys an antique chair for £600.

It is expected to increase in value at a rate of $4 \cdot 5\%$ each year.

How much is it expected to be worth in 3 years?

Fractions and Percentages

Section D - Reasoning Skills Section

1. Jamie is going to bake cakes for a party.

    He needs $\frac{2}{5}$ of a block of butter for 1 cake.

    He has 7 blocks of butter. How many cakes can he bake?

2. Due to the threat of global warming, scientists recommended in 2010 that the emissions of greenhouse gases should be reduced by 50% by the year 2050.

    The government decided to reduce the emissions by 15% every ten years, starting in the year 2010.

    Will the scientists' recommendations have been achieved by 2050?

    You must give a reason for your answer.

3. A new fraction is obtained by adding x to the numerator and denominator of the fraction $\frac{17}{24}$.

    The new fraction is equivalent to $\frac{2}{3}$.

    Calculate the value of x.

4. A company makes larger bags of crisps which contain 90 grams of fat.

    The company aims to reduce the fat content of the crisps by 50%.

    They decide to reduce the fat content by 20% each year.

    Will they Have achieved their aim by the end of the 3rd year?

    Justify your answer.

Fractions and Percentages

Answers

Section A - Revision

R1

Q1 **(a)** $\frac{2}{3}$ **(b)** $\frac{13}{40}$ **(c)** $\frac{2}{5}$ **(d)** $\frac{1}{24}$

Q2 **(a)** $\frac{2}{3}$ **(b)** $\frac{4}{7}$ **(c)** $\frac{8}{15}$ **(d)** $1\frac{5}{27}$

Q3 **(a)** $5\frac{1}{3}$ **(b)** $8\frac{23}{36}$ **(c)** $2\frac{3}{4}$ **(d)** $4\frac{1}{2}$

(e) $4\frac{1}{2}$ **(f)** $7\frac{1}{2}$ **(g)** $\frac{1}{2}$ **(h)** $1\frac{1}{5}$

R2

Q1(a)(i) $0\cdot1$ **(ii)** $\frac{1}{10}$ **(b)(i)** $0\cdot8$ **(ii)** $\frac{4}{5}$

(c) **(i)** $0\cdot35$ **(ii)** $\frac{7}{20}$ **(d)(i)** $0\cdot12$ **(ii)** $\frac{3}{25}$

(e) **(i)** $0\cdot44$ **(ii)** $\frac{11}{25}$ **(f)(i)** $0\cdot666\ldots$ **(ii)** $\frac{2}{3}$

(g) **(i)** $0\cdot25$ **(ii)** $\frac{1}{4}$ **(h)(i)** $0\cdot77$ **(ii)** $\frac{77}{100}$

Q2(a)(i) $0\cdot27$ **(ii)** 27% **(b)(i)** $0\cdot06$ **(ii)** 6%

(c) **(i)** $0\cdot8$ **(ii)** 80% **(d)(i)** $0\cdot7$ **(ii)** 70%

(e) **(i)** $0\cdot45$ **(ii)** 45% **(f)(i)** $0\cdot333\ldots$ **(ii)** $33\frac{1}{3}\%$

(g) **(i)** $0\cdot6$ **(ii)** 60% **(h)(i)** $0\cdot3$ **(ii)** 30%

Q3 **(a)** 120% **(b)** 40% **(c)** 125% **(d)** 65%

(e) 88% **(f)** 118% **(g)** 95% **(h)** 108%

(i) 97%

Section B

(1) £13 542·40 **(2)** £2 676·45

(3) **a(i)** A = $3\frac{1}{4}$ m² **(ii)** P = $7\frac{7}{10}$ m **b** **(i)** A = $14\frac{14}{15}$ m² P = $15\frac{11}{15}$ m

(4) **a** $35\cdot71$ cm **b** $39\cdot36$ cm

Fractions and Percentages

Section C

O1

(1) £11 600	**(2)** £3·50	**(3)** £527·08	**(4)** £17 000
(5) £40 000	**(6)** £56·25	**(7)** £500	**(8)** £135
(9) £4500	**(10)** £860	**(11)** £200	

O2

(1) $517 500	**(2)** £19526·10	**(3)** £83 904	**(4)** £1 193·28
(5) £132 848·10			

O3

(1) £1721·24	**(2)** £428·28	**(3)** £10 028·75	**(4)** £694·58
(5) 3·03 million	**(6)** £30 405·02	**(7)** £155 000	**(8)** £59 625·93
(9) £147 900	**(10)** 41 miles	**(11)** 35 437·5 tonnes	**(12)** £684·70

Section D

(1) 17 cakes

(2) No, as 50% reduction is 0·5 and $(0·85)^4 = 0·522$ of a reduction.

(3) $x = -3$

(4) 50% would have 45g

$(0·8)^{10}$ x 90 = 46·08g

So they will not achieve their aim of 45g in 3 years as 46·08g > 45g.