CHAPTER 3
Percentages

Changing percentages to fractions and fractions to percentages

QUESTION **1**   Change the following percentages to fractions in simplest form.

a   10% = _____

b   50% = _____

c   90% = _____

d   15% = _____

e   20% = _____

f   60% = _____

g   75% = _____

h   57% = _____

i   76% = _____

j   19% = _____

k   55% = _____

l   98% = _____

QUESTION **2**   Convert the following percentages to fractions in simplest form.

a   1.5% = _____

b   1.6% = _____

c   11.4% = _____

d   9.4% = _____

e   2.5% = _____

f   5.6% = _____

g $\dfrac{7}{8}$% = _____

h $\dfrac{1}{10}$% = _____

i $\dfrac{1}{20}$% = _____

j $\dfrac{1}{6}$% = _____

k $\dfrac{9}{10}$% = _____

l $30\dfrac{1}{4}$% = _____

QUESTION **3**   Express the following percentages as fractions in simplest form.

a   26% = _____

b $33\dfrac{1}{3}$% = _____

c $50\dfrac{1}{2}$% = _____

d $2\dfrac{1}{4}$% = _____

e $15\dfrac{3}{4}$% = _____

f   86% = _____

g $35\dfrac{1}{2}$% = _____

h   36% = _____

i $66\dfrac{2}{3}$% = _____

QUESTION **4**   Change the following fractions to percentages.

a $\dfrac{3}{100}$ = _____

b $\dfrac{7}{100}$ = _____

c $\dfrac{11}{100}$ = _____

d $\dfrac{23}{100}$ = _____

e $\dfrac{37}{100}$ = _____

f $\dfrac{39}{100}$ = _____

g $\dfrac{17}{70}$ = _____

h $\dfrac{19}{80}$ = _____

i $\dfrac{9}{120}$ = _____

j $\dfrac{21}{90}$ = _____

k $\dfrac{7}{110}$ = _____

l $\dfrac{12}{150}$ = _____

QUESTION **5**   Convert the following fractions to percentages.

a $\dfrac{3}{5}$ = _____

b $\dfrac{6}{35}$ = _____

c $\dfrac{9}{45}$ = _____

d $\dfrac{7}{9}$ = _____

e $\dfrac{2}{3}$ = _____

f $\dfrac{1}{8}$ = _____

Percentages

Changing percentages to decimals and decimals to percentages

QUESTION **1**   Change the following percentages to decimals.

a   30% = _____

b   20% = _____

c   110% = _____

d   70% = _____

e   80% = _____

f   60% = _____

g   65% = _____

h   45% = _____

i   155% = _____

j   95% = _____

k   105% = _____

l   25% = _____

QUESTION **2**   Express the following percentages as decimals.

a   4% = _____

b   62% = _____

c   56% = _____

d   65.7% = _____

e   68.7% = _____

f   37.4% = _____

g   68.9% = _____

h   53.6% = _____

i   59.6% = _____

j   91.7% = _____

k   43.9% = _____

l   68.9% = _____

QUESTION **3**   Convert the following percentages to decimals.

a $1\frac{1}{2}\% =$ _____

b $3\frac{1}{5}\% =$ _____

c $18\frac{1}{2}\% =$ _____

d $12\frac{1}{2}\% =$ _____

e $6\frac{1}{4}\% =$ _____

f $25\frac{1}{4}\% =$ _____

QUESTION **4**   Convert the following decimals to percentages.

a   0.40 = _____

b   0.90 = _____

c   0.60 = _____

d   0.15 = _____

e   0.20 = _____

f   0.45 = _____

g   0.138 = _____

h   0.234 = _____

i   0.482 = _____

j   0.356 = _____

k   0.504 = _____

l   0.579 = _____

QUESTION **5**   Express the following decimals as percentages.

a   0.007 = _____

b   0.009 = _____

c   0.001 = _____

d   0.013 = _____

e   0.015 = _____

f   0.006 = _____

g   0.005 = _____

h   0.003 = _____

i   0.002 = _____

j   0.012 = _____

k   0.023 = _____

l   0.034 = _____

QUESTION **6**   Convert the following decimals to percentages.

a   1.35 = _____

b   2.11 = _____

c   9.123 = _____

d   2.46 = _____

e   6.87 = _____

f   6.118 = _____

g   5.79 = _____

h   3.57 = _____

i   8.42 = _____

Percentages

Finding the percentage of a quantity

QUESTION **1**   Calculate the following.

a   10% of 200 = _____

b   80% of 700 = _____

c   120% of 800 = _____

d   70% of 400 = _____

e   50% of 300 = _____

f   30% of 900 = _____

g   40% of 800 = _____

h   90% of 600 = _____

i   60% of 500 = _____

j   110% of 1200 = _____

k   20% of 1300 = _____

l   130% of 1000 = _____

QUESTION **2**   Find the following.

a   5% of 1100 = _____

b   45% of 350 = _____

c   105% of 960 = _____

d   65% of 2500 = _____

e   75% of 800 = _____

f   25% of 450 = _____

g   35% of 1500 = _____

h   15% of 225 = _____

i   115% of 675 = _____

j   85% of 300 = _____

k   95% of 840 = _____

l   55% of 825 = _____

QUESTION **3**   Evaluate the following.

a   3% of 130 = _____

b   21% of 560 = _____

c   64% of 1256 = _____

d   24% of 245 = _____

e   46% of 1024 = _____

f   72% of 670 = _____

g   35% of 368 = _____

h   83% of 492 = _____

i   98% of 830 = _____

j   34% of 962 = _____

k   58% of 1132 = _____

l   68% of 1360 = _____

QUESTION **4**   Work out the following.

a   2.5% of 130 = _____

b   9.3% of 960 = _____

c   1.4% of 780 = _____

d   6.7% of 410 = _____

e   5.6% of 260 = _____

f   7.9% of 1290 = _____

g   4.9% of 580 = _____

h   3.8% of 670 = _____

i   6.5% of 390 = _____

j   8.5% of 1640 = _____

k   8.3% of 1036 = _____

l   7.2% of 1450 = _____

QUESTION **5**   Find the answers to the following.

a $2\frac{1}{2}$% of 600 = _____

b $33\frac{1}{3}$% of 100 = _____

c $45\frac{3}{4}$% of 900 = _____

d $58\frac{1}{2}$% of 1100 = _____

e $75\frac{1}{2}$% of 500 = _____

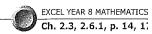f $12\frac{1}{2}$% of 300 = _____

g $25\frac{1}{4}$% of 400 = _____

h $1\frac{1}{2}$% of 700 = _____

i $90\frac{1}{2}$% of 800 = _____

QUESTION **6**   Evaluate the following.

a   8% of 350 = _____

b   8.4% of 100 = _____

c $12\frac{1}{2}$% of 864 = _____

d $6\frac{1}{4}$% of 300 = _____

e   50% of 710 = _____

f   20.6% of 537 = _____

g   3.5% of 875 = _____

h $16\frac{3}{4}$% of 400 = _____

i   60% of 200 = _____

Percentages

Increasing or decreasing by a given percentage

QUESTION **1**   Increase the following by the given percentage.

a $90 by 10% = _____

b   72 h by 60% = _____

c $450 by 50% = _____

d   800 ha by 30% = _____

e $600 by 70% = _____

f   56 min by 80% = _____

g   500 g by 20% = _____

h   850 L by 40% = _____

i   620 kg by 100% = _____

j   60 t by 90% = _____

k $840 by 15% = _____

l   870 cm by 65% = _____

QUESTION **2**   Decrease the following by the given percentage.

a $285 by 20% = _____

b $96 by 20% = _____

c   16 m by 10% = _____

d   580 L by 80% = _____

e $930 by 60% = _____

f $4864 by 35% = _____

g $235 by 70% = _____

h $1525 by 85% = _____

i $680.50 by 5% = _____

j $550 by 90% = _____

k $240 by 30% = _____

l $660 by 40% = _____

QUESTION **3**   Find the answers to the following.

a   Increase $300 by 10% = _____

b   Increase 1500 L by 20% = _____

c   Decrease $550 by 20% = _____

d   Decrease 240 t by 25% = _____

e   Decrease 28 m by 25% = _____

f   Decrease 600 by 15% = _____

g   Increase $860 by 30% = _____

h   Increase $800 by 30% = _____

i   Increase $1024 by 40% = _____

j   Decrease $2000 by 24% = _____

k   Decrease $230 by 5% = _____

l   Increase $2500 by 25% = _____

QUESTION **4**

a   The price of a new car is $36 000 and after 1 year it decreases by 20%. Find the new value of the car.

_____

Find the simple interest earned on:

b $2500 at 12% p.a. for 1 year _____

_____

c $36 000 at 8% p.a. for 2 years _____

_____

d $6540 at 10% p.a. for 5 years _____

_____

Percentages

Expressing quantities as percentages

QUESTION **1**   What percentage is:

a   30 of 300? = _____

b   20 cents of $5? = _____

c   20 of 1600? = _____

d   70 of 280? = _____

e   14 of 90? = _____

f   12 of 60? = _____

g   27 of 63? = _____

h   82 of 90? = _____

i   120 of 480? = _____

j   40 cents of $8? = _____

k   9 h of 1 day? = _____

l   24 cm of 2 m? = _____

QUESTION **2**   What percentage is the first quantity of the second quantity?

a   8 L, 240 L = _____

b   120 g, 9 kg = _____

c   6 m, 72 m = _____

d   200 cm, 4.8 m = _____

e   15 kg, 180 kg = _____

f $1.25, $10 = _____

g   60 mL, 300 mL = _____

h   375 mL, 12 L = _____

i   24 s, 2 min = _____

j $2.50, $8 = _____

k   12 h, 6 days = _____

l $3, 900 cents = _____

QUESTION **3**   What percentage is:

a   25 cents of $4? = _____

b   400 g of 6 kg? = _____

c   14 min of 6 h? = _____

d $10 of 350 cents? = _____

e   750 m of 8 km? = _____

f   64 kg of 2 t? = _____

g   80 cents of $5.60? = _____

h   12 min of 4 h? = _____

i   8 mm of 72 cm? = _____

j   12 mm of 2.4 m? = _____

k   54 cm of 162 cm = _____

l   800 g of 4 kg? = _____

QUESTION **4**   Work out the following.

a   What percentage is 42 seconds of 3 minutes?

_____

b   What percentage is 80 of 448?

_____

c   Express 12 grams as a percentage of 216 grams.

_____

d   Interest charges are $640 on a loan of $12 800. What percentage is the the interest on the loan?

_____

Percentages

Unitary method and percentages

QUESTION **1**   Work out the following.

a   If 20% of a number is 68, what is the number? _____

b   If 25% of a number is 230, what is the number? _____

c   Find the total cost if 30% of it is $720. _____

d   If 32% of a number is 800, what is the number? _____

e   If 120% of a number is 80, what is the number? _____

QUESTION **2**   Use the unitary method to solve the following.

a   40% of a number is 54. What is the number? _____

b   50% of a number is 360. What is the number? _____

c   35% of a number is 28. What is the number? _____

d   68% of a number is 152. What is the number? _____

e   15% of a number is 69. What is the number? _____

QUESTION **3**   Find 100% of the number if a part of it is given.

a   2% is 20; 100% = _____   b   10% is 98; 100% = _____

c   5% is 30; 100% = _____   d   15% is 80; 100% = _____

e   30% is 15; 100% = _____   f $12\frac{1}{2}$% is 960; 100% = _____

g   45% is 28; 100% = _____   h $33\frac{1}{3}$% is 1920; 100% = _____

i   60% is 300; 100% = _____   j   75% is 680; 100% = _____

k   8% is 240; 100% = _____   l   40% is 75; 100% = _____

QUESTION **4**   Find answers to the following.

a   John spends $55 per week on food. If he spends 20% of his income on food, what is his weekly incoɪ

_____

b   I spent 48% of my allowance on a movie which cost me $15.50. How much is my allowance?

_____

c   If $66\frac{2}{3}$% of a number is 27, find the number.

_____

d   Lisa's income increased by 4%. If her income rose by $830, find her previous income.

_____

Percentages

Problem solving with percentages

1 There are 40 students in a class and 30% are absent. How many are present?

2 Find 8% of 2 kg, giving the answer in grams.

3 If 7% of a number is 133, what is the number?

Sarah pays 20% of her total weekly income in tax. If she receives $420 income per week, find:

4 Sarah's total weekly tax? _____

5 How much money Sarah receives after the tax has been taken out? _____

6 Increase $800 by 8% and then decrease the result by 8%.

7 Find the simple interest on $350 for 2 years at a rate of 9% p.a.

8 A book was bought for $2.25 and sold for $2.40. What is the gain percent?

9 Add 125% of $84 to 21% of $200.

10 21 out of 35 students play tennis. What percentage of the class play tennis?

11 I spend 20% of my money to buy a car for $8600. How much did I have before buying the car?

12 A block of land bought for $20 600 increased in value 12%. What is the new value?

13 If after a $12\frac{1}{2}$% pay rise I receive $480, how much did I earn before the pay rise?

14 If 40% of a number is 120, find the number.

15 Find the simple interest on $3000 for 2 years at $6\frac{1}{4}$% p.a.

Percentages

TOPIC TEST

Instructions
- This part consists of 15 multiple choice questions
- Fill in only ONE CIRCLE for each question
- Each question is worth 1 mark
- Calculators may be used

Time allowed: 15 minutes   **Total marks = 15**

M

1 As a decimal $4\frac{1}{2}\%$ equals

(A) 0.42   (B) 0.45   (C) 0.042   (D) 0.045   [

2 15% of 1.5 tonnnes equals

(A) 22.5 kg   (B) 100 kg   (C) 225 kg   (D) 1000 kg   [

3 A toy was reduced in price from \$40 to \$36. What is the percentage discount?

(A) 4%   (B) 10%   (C) 11%   (D) 96%   [

4 What would John pay for a CD player that sells for \$550 but is discounted by 15%?

(A) \$82.50   (B) \$467.50   (C) \$535   (D) \$632.50   [

5 $P\%$ of \$$d$ is

(A) \$$Pd$ (B) $\$\left(\dfrac{P+d}{100}\right)$ (C) \$$100Pd$ (D) $\$\dfrac{Pd}{100}$ [

6 To increase 80 by 13% you evaluate

(A) $80 + 1.13$ (B) 80×0.13 (C) 80×1.13 (D) $80 + \dfrac{13}{100}$ [

7 $\frac{1}{3}$ expressed as a percentage is

(A) $\frac{1}{3}\%$ (B) 3%   (C) 30%   (D) none of these [

8 Express 7% as a decimal.

(A) 7.0   (B) 0.7   (C) 0.07   (D) none of these [

9 Find 40% of 120 km

(A) 3 km   (B) 4.8 km   (C) 30 km   (D) 48 km   [

10 Increase 250 by 6%

   (A) 265   (B) 256   (C) 400   (D) none of these

                                                                                                            `1`

11 In a test a student gets 10 questions wrong out of 25. What percentage of questions are correct?

   (A) 15%   (B) 40%   (C) 60%   (D) 90%   `1`

12 After 20% of a bill is paid, $60 still remains to be paid. How much was the total bill?

   (A) $12   (B) $63   (C) $72   (D) $75   `1`

13 $\dfrac{8}{20}$ equals

   (A) 8%   (B) 16%   (C) 40%   (D) 80%   `1`

14 Which of the following marks is better than 50%?

   (A) 9 out of 25   (B) 40 out of 70   (C) 50 out of 200   (D) 55 out of 120   `1`

15 A concrete mixture contains 1 part cement, 2 parts sand and 2 parts gravel. What percentage of the mixture is sand?

   (A) 20%   (B) $33\dfrac{1}{3}\%$ (C) 40%   (D) $66\dfrac{2}{3}\%$ `1`

Total marks achieved for PART A   / 15

Percentages

TOPIC TEST

Instructions
- This part consists of 15 questions
- Each question is worth 1 mark
- Write answers in the 'Answers only' column

Time allowed: 15 minutes

Total marks = 15

Questions	Answers only	Mar
1 Express 900% as a fraction.		1
2 What percentage is 5 of 30?		1
3 If 150 is 20% of a number, what is the number?		1
4 Find 31% of 300.		1
5 Increase 180 kg by 10%.		1
6 Decrease 860 by 5%.		1
7 Write $\dfrac{3}{5}$ as a percentage.		1
8 Write 0.74 as a percentage.		1
9 If 4% of an amount is 15, what is the amount?		1
10 Increase 100 by 8% and decrease the result by 8%.		1
11 If 5% = 5 then 12% =		1
12 Write the simplest fraction for 88%.		1
13 Find $33\dfrac{1}{3}$% of 270.		1
14 Change 66% to a fraction.		1
15 Find 100% given that 12% is 108.		1

Total marks achieved for PART B

Percentages

Instructions • This part consists of 4 questions
• Each question is worth 5 marks
• Show all necessary working

Time allowed: 20 minutes　　　　　　　**Total marks = 20**

Marks

1　Convert the following to percentages.

　a　0.9 _____

　c　$\dfrac{52}{100}$ _____

　e　1.65 _____

　b　0.06 _____

　d　$3\dfrac{2}{5}$ _____

[5]

2　Find the percentage of each quantity.

　a　5% of 2800 cm _____

　c　53% of 8.5 L _____

　e　125% of 84 _____

　b　85% of $260 _____

　d　$24\dfrac{1}{2}\%$ of 12 hours _____

[5]

3　Complete the table.

	Fraction	Percentage	Decimal
a		55%	
b			0.85
c	$12\dfrac{1}{2}$		
d		$6\dfrac{1}{4}\%$	
e	$\dfrac{3}{5}$		

[5]

4　Write the first quantity as a percentage of the second quantity.

　a　48 g, 100 g _____

　b　45 min, 3 h _____

　c　248 cm, 2 m _____

　d　Increase $240 by 30% _____

　e　Decrease $80 by 20% _____

[5]

Total marks achieved for PART C　　　／20

Answers

36, 100, 100 **9** 8, 15, 17, 64, 225, 289, 289 **10** 40, 9, 41, 1600, 81, 1681, 1681 **11** 24, 18, 30, 576, 324, 900, 900 **12** 80, 18, 82, 6400, 324, 6724, 6724

PAGE 14 1 c 2 c 3 b 4 c 5 c 6 c 7 c 8 b 9 c 10 c 11 c 12 b 13 c 14 a 15 c 16 b

PAGE 15 1 a 25 b 225 c 784 d 961 e 8464 f 81 g 3136 h 49 i 3721 j 1024 k 7225 l 6084 2 a 2 b 1
c 3 d 4 e 7 f 8 g 5 h 9 i 10 j 12 k 6 l 11 3 a 28 b 17 c 37 d 13 e 14 f 49 g 21 h 34 i 18
j 16 k 15 l 63 4 a 1.69 b 31.36 c 62.41 d 27.04 e 44.89 f 69.7225 g 68.89 h 69.2224 i 126.5625 j 94.09
k 29.2681 l 492.84 5 a 31.4721 b 10.24 c 39.8161 d 60.84 e 28.09 f 182.25 g 34.81 h 46.24 i 231.04
j 44.89 k 84.64 l 80.1025 6 a 2.3 b 2.6 c 7.3 d 2.8 e 1.8 f 9.7 g 2.8 h 2.6 i 7.9 j 2.9 k 2.9 l 8.6

PAGE 16 All answers are in cm. 1 a 5 b 13 c 10 d 26 e 17 f 25 2 a 9.8 b 7.1 c 14.0 d 8.7 e 5.9 f 18.8
g 10.8 h 8.5 i 7.2

PAGE 17 All answers are in cm. 1 a 6 b 8 c 24 d 4 e 9 f 15 2 a 9.90 b 12.39 c 13.89 d 17.35 e 8.39
f 10.40 g 18.90 h 20.03 i 6.62

PAGE 18 All answers are in cm. 1 a 5 b 5 c 8 d 7 e 9 f 10 2 a 15.0 b $x = 10.0, y = 10.4$ c 14.5 d 9.9 e 9.0
f 9.0 g 14.1 h 7.8 i 14.6

PAGE 19 1 e, f, g, i, j, k, l

PAGE 20 1 7.6 cm 2 13.7 cm 3 16.0 cm 4 16.6 cm 5 23.3 cm 6 12.1 cm 7 29.4 cm 8 9.9 cm 9 10.39 cm
10 47.51 cm 11 42.06 cm 12 5.20 m 13 6.98 14 6.54 15 11.18

PAGES 21 & 22 1 D 2 D 3 A 4 C 5 C 6 D 7 C 8 B 9 A 10 D 11 B 12 B 13 C 14 B 15 C

PAGE 23 1 69 2 yes 3 yes 4 6 cm 5 12 cm 6 50 cm 7 8.66 m 8 5.00 m 9 12.53 m 10 14.21 cm 11 11.31 cm
12 13.86 cm 13 21.54 cm 14 21.82 cm 15 36.93 cm

PAGE 24 1 a 13 b 6 c 15 d 5 e hypotenuse 2 a right-angled triangle b 10 c 8 cm d 5.6 m e 11.9 m
3 a $c^2 = a^2 + b^2$ b 13 m c 8 cm d 5 m e 3 m 4 a $x = 15.65, y = 9.12$ b 20.81 c 3.53 m d 24.25 m

PAGE 25 1 a $\frac{1}{10}$ b $\frac{1}{2}$ c $\frac{9}{10}$ d $\frac{3}{20}$ e $\frac{1}{5}$ f $\frac{3}{5}$ g $\frac{3}{4}$ h $\frac{57}{100}$ i $\frac{19}{25}$ j $\frac{19}{100}$ k $\frac{11}{20}$ l $\frac{49}{50}$ 2 a $\frac{3}{200}$ b $\frac{2}{125}$

c $\frac{57}{500}$ d $\frac{47}{500}$ e $\frac{1}{40}$ f $\frac{7}{125}$ g $\frac{7}{800}$ h $\frac{1}{1000}$ i $\frac{1}{2000}$ j $\frac{1}{600}$ k $\frac{9}{1000}$ l $\frac{121}{400}$ 3 a $\frac{13}{50}$ b $\frac{1}{3}$ c $\frac{101}{200}$

d $\frac{9}{400}$ e $\frac{63}{400}$ f $\frac{43}{50}$ g $\frac{71}{200}$ h $\frac{9}{25}$ i $\frac{2}{3}$ 4 a 3% b 7% c 11% d 23% e 37% f 39% g $24\frac{2}{7}$% h $23\frac{3}{4}$%

i $7\frac{1}{2}$% j $23\frac{1}{3}$% k $6\frac{4}{11}$% l 8% 5 a 60% b $17\frac{1}{7}$% c 20% d $77\frac{7}{9}$% e $66\frac{2}{3}$% f $12\frac{1}{2}$%

PAGE 26 1 a 0.3 b 0.2 c 1.1 d 0.7 e 0.8 f 0.6 g 0.65 h 0.45 i 1.55 j 0.95 k 1.05 l 0.25 2 a 0.04 b 0.62
c 0.56 d 0.657 e 0.687 f 0.374 g 0.689 h 0.536 i 0.596 j 0.917 k 0.439 l 0.689 3 a 0.015 b 0.032 c 0.185
d 0.125 e 0.0625 f 0.2525 4 a 40% b 90% c 60% d 15% e 20% f 45% g 13.8% h 23.4% i 48.2% j 35.6%
k 50.4% l 57.9% 5 a 0.7% b 0.9% c 0.1% d 1.3% e 1.5% f 0.6% g 0.5% h 0.3% i 0.2% j 1.2% k 2.3%
l 3.4% 6 a 135% b 211% c 912.3% d 246% e 687% f 611.8% g 579% h 357% i 842%

PAGE 27 1 a 20 b 560 c 960 d 280 e 150 f 270 g 320 h 540 i 300 j 1320 k 260 l 1300 2 a 55
b 157.5 c 1008 d 1625 e 600 f 112.5 g 525 h 33.75 i 776.25 j 255 k 798 l 453.75 3 a 3.9 b 117.6
c 803.84 d 58.8 e 471.04 f 482.4 g 128.8 h 408.36 i 813.4 j 327.08 k 656.56 l 924.8 4 a 3.25 b 89.28
c 10.92 d 27.47 e 14.56 f 101.91 g 28.42 h 25.46 i 25.35 j 139.4 k 85.988 l 104.4 5 a 15 b $33\frac{1}{3}$ c $411\frac{3}{4}$
d 643.5 e 377.5 f $37\frac{1}{2}$ g 101 h 10.5 i 724 6 a 28 b 8.4 c 108 d 18.75 e 355 f 110.622 g 30.625
h 67 i 120

PAGE 28 1 a $99 b 115.2 h c $675 d 1040 ha e $1020 f 100.8 min g 600 g h 1190 L i 1240 kg j 114 t k $966
l 1435.5 cm 2 a $228 b $76.80 c 14.4 m d 116 L e $372 f $3116.60 g $70.50 h $228.75 i $646.48 j $55
k $168 l $396 3 a $330 b 1800 L c $440 d 180 t e 21 m f 510 g $1118 h $1040 i $1433.60 j $1520
k $218.50 l $3125 4 a $28 800 b $300 c $5760 d $3270

PAGE 29 1 a 10% b 4% c 1.25% d 25% e 15.56% f 20% g 42.86% h 91.1% i 25% j 5% k 37.5% l 12%
2 a 3.3% b 1.33% c 8.33% d 41.67% e 8.33% f 12.5% g 20% h 3.125% i 20% j 31.25% k 8.33% l 33.33%
3 a 6.25% b 6.67% c 3.89% d 285.71% e 9.375% f 3.2% g 14.29% h 5% i 1.11% j 0.5% k 33.33% l 20%
4 a $23\frac{1}{3}$% b 17.86% c 5.56% d 5%

PAGE 30 1 a 340 b 920 c $2400 d 2500 e $66\frac{2}{3}$ 2 a 135 b 720 c 80 d 223.53 e 460 3 a 1000 b 980
c 600 d $533\frac{2}{3}$ e 50 f 7680 g 62.22 h 5760 i 500 j $906\frac{2}{3}$ k 3000 l 187.5 4 a $275 b $32.29 c 40.5
d $20 750

PAGE 31 1 28 2 160 g 3 1900 4 $84 5 $336 6 $794.88 7 $63 8 $6\frac{2}{3}$% 9 $147 10 60% 11 $43 000

Answers

12 $23 072 **13** $426.67 **14** 300 **15** $375

PAGES 32 & 33 **1** D **2** C **3** B **4** B **5** D **6** C **7** D **8** C **9** D **10** A **11** C **12** D **13** C **14** B **15** C

PAGE 34 **1** 9 **2** $16\frac{2}{3}$ **3** 750 **4** 93 **5** 198 kg **6** 817 **7** 60% **8** 74% **9** 375 **10** 99.36 **11** 12 **12** $\frac{22}{25}$ **13** 90

14 $\frac{33}{50}$ **15** 900

PAGE 35 **1** a 90 b 6 c 52 d 340 e 165 **2** a 140 cm b $221 c 4.505 L d 2.94 h e 105 **3** a $\frac{11}{20}$, 0.55

b $\frac{17}{20}$, 85% c 1250%, 12.5 d $\frac{1}{16}$, 0.0625 e 60%, 0.6 **4** a 48% b 25% c 124% d $312 e $64

PAGE 36 **1** a $11x$ b $16x$ c $16x$ d $27x$ e $41x$ f $45x$ g $14xy$ h $20mn$ i $38a$ j $18x$ k $42a^2$ l $19p$ **2** a $4a$ b $8a$
c $5a$ d $15x$ e $7m$ f $4y$ g $6x$ h $2xy$ i $22x^2$ j $8y$ k $5x$ l $11p$ **3** a $12a$ b $8x$ c $14a$ d $14a$ e $20xy$ f $8mn$ g $9x^2$
h $13a^2$ i $5x$ j $16t$ k $10m$ l $12a$ **4** a $3x + 5y$ b $9a + 11b$ c $5m + 2n$ d $4x^2$ e $2a + 5b$ f $14a - 6b$ g $15y - 7x$ h $6xy$
5 a $22 - 10x$ b $3m + 3n$ c $19x - 2y$ d $11x^2 - 7y^2$ e $8m + 2n$ f $6xy + 6yz$ g $9a + 6b$ h $3a + 6b$ i $6t + 3$ j $18ab$

PAGE 37 **1** a $10a$ b $18b$ c $72y$ d $21y$ e $-6ab$ f $6a$ g $-3ab$ h $6ab$ i $18x$ j $-45a^2b$ k $16a^2$ l $12x^2$ **2** a $18ab$
b $6x^2$ c $40xy$ d $24y^2$ e $27ab$ f $-30a^2$ g $48y^2$ h $6t^2$ i $54x^2y$ j $-30a^2b$ **3** a $2a^2b$ b $90a$ c $30a^2bc$ d $a^2b^2c^2$ e $-54ab^2c$
f $42a^2p$ g $-40x$ h $6xy^2$ **4** a $40ab$ b $14k^2$ c $-72x^2y^2$ d $8a^3x^2$ e $36m^2$ f $24m^2t$ g $3y^3$ h $-30x^2$ **5** a $-8a^2b^2$ b $-84a^2$
c $-18x^2y$ d $30abc$ e $-4a^2b$ f $-x^2y$ g $25p^2$ h $-36a^2$

PAGE 38 **1** a $3a$ b $3pq$ c $\frac{4}{5m}$ d $3x$ e $3y$ f $6a$ g $2a$ h $9x$ i $\frac{3}{y}$ **2** a 3 b $4y$ c $3n$ d $8m$ e $-x$ f $8b$ g 4
h $8a$ i $4y$ j $-3b$ k $3b$ l $4x$ **3** a $-3x$ b $-2b$ c $2y$ d $3x$ e $3y$ f 4 g $4x^2$ h $12y$ i $-5q$ j $10n$ **4** a -4 b 17
c $-8x$ d -2 e $2x$ f $6m$ g $5y$ h $8b$ **5** a $-4b$ b $4x$ c -1 d $9y$ e 1 f $\frac{ab}{c}$ g $\frac{3}{b}$ h $2x$

PAGE 39 **1** a $16a^2$ b $60a^2c$ c $15a^2$ d $288a^4$ e $-27x^2$ f $-36a^3$ g $45x^3y$ h $15y^3$ i $96a^2b$ j $72a^3$ k $3a^4b$ l $9a^3b^3$

2 a 5 b 9 c 6 d 25 e $-2q$ f $-7x$ g $-4b$ h $-4a$ i $4p$ j $4yz$ k 5 l $-9n$ **3** a -9 b $\frac{-5b}{a}$ c -1 d $7abc$ e 3

f $7t$ g $4y$ h $-5b$ i $\frac{5}{2}$ j $-5a$ **4** a $-15a^2$ b $40abc$ c $-56x^2$ d $48a^3$ e $-30a^2b$ f $-40x^2y$ g $36a^3b^2$ h $-a^4b^4$ i $8xy^3$

j $-15x^2y$ **5** a 6 b 12 c $\frac{10}{3}$ d $4b^2$ e $6ab$ f $-x$

PAGE 40 **1** a a^5 b $6p^5$ c y^{11} d m^7 e $32a^8$ f x^{15} g x^{12} h $72a^9$ i $80p^{11}$ j x^{20} k a^7b^7 l $36x^7y^5$ **2** a a^4 b $4m^2$
c $4ab$ d a^8 e k^5 f $2a^2b^5$ g a^{12} h $4a^2$ i $-9x^{10}y$ j m^7 k m^2n^2 l $8a^2b^2$ **3** a a^6 b y^{20} c $64x^4y^6$ d m^{10} e x^{21}
f $729a^3b^6$ g x^{24} h $64a^6$ i $125m^{12}$ j a^{42} k $81p^4$ l $1000a^9b^9$ **4** a 1 b 1 c 9 d 1 e 1 f 2 g 1 h 1 i 1

5 a x^7 b p^4q c a^{14} d m^9 e $64p^4$ f x^6 g $30x^5$ h $9m^6n$ i $3x^3$ **6** a $12a^{12}$ b $2ab^4$ c a^2 d $9a$ e $\frac{4a^2}{b^2}$ f $45a^2b^2$

g x^3 h a^6b^3 i $4xy$

PAGE 41 **1** a $3x + 3y$ b $10a + 15b$ c $8a + 12$ d $48a - 42b$ e $8m + 24p$ f $15a - 12m$ g $5x^2 + 40x$ h $7x - 35$
i $9a^2 - 18ab$ j $24x - 36$ k $12am + 6mn$ l $45x - 105$ **2** a $-3x - 6$ b $-10x^2 - 5x$ c $-4x + 14$ d $-16x^2 + 6xy$ e $-12x + 15$
f $-xy - y^3$ g $-64x + 72$ h $-3m^2 - 8m$ i $-2x^2 - 2x$ j $-16n + 10mn$ k $-6x^2 - 15x$ l $-12t^2 + 18t$ **3** a $10x + 35$ b $21x - 77$
c $-12x + 27$ d $-8x - 20$ e $48y + 24$ f $-15a^2 - 15a$ g $-2x^2 - 7x$ h $-8m^2 + 5m$ i $-6t^2 - 10t$ j $16a^2 + 24ab$ k $-24x^2 + 40x$
l $12p^2 - 18mp$ **4** a $7x + 6$ b $11y + 17$ c $2xy - 35$ d $p - 70$ e $2y^2 + 12y$ f $5x + 6$ g $12p - 24$ h $9m - 16$ i $8m^2 + 9m$
j $4x - 26$ k $5t - 24$ l $3x + 54$ **5** a $6m + 14$ b $2x + 18$ c $19x + 62$ d $8x + 76$ e $3y + 37$ f $17x + 24$ g $5n - 32$
h $2x^2 - 3$

PAGE 42 **1** a 28 b 336 c $2\frac{1}{3}$ d 784 e 4032 f 209 g 23 h 37 i -11 j 71 k 1316 l 380 **2** a 27 b 1
c 7 d 69 e 96 f 88 g 50 h 64 i 3 j 45 k 48 l -33 **3** a 10.7 b 17.1 c 34.2 d 23.13 e 114.49 f 483.84
g 425.088 h 5.0 i 0.2 j 4.1 k 8.8 l 3.9 **4** a 138 b 50 c 360 d -18 e 32 f 11 g 212 h -5 i 30

PAGE 43 **1** a $7(x + 1)$ b $2(5a - 1)$ c $7(y + 2)$ d $4(2x - 1)$ e $3(a + 5)$ f $4(x - 3y)$ g $3(y + 1)$ h $5(m + 6)$ i $4(8x - 7)$
j $5(a - 1)$ k $2(3a - b)$ l $5(a + 7)$ **2** a $y(y + 3)$ b $3y^2(2y - 1)$ c $3x^2(2x - 1)$ d $2m(m + 3)$ e $4a(2a - 1)$ f $m(m - 9)$
g $8a(a + 3)$ h $3y(5y - 2)$ i $8a(2a - 1)$ j $x(x + 9)$ k $3a^2(3a - 2)$ l $7x(4x - 1)$ **3** a $-3(x + 1)$ b $-4(y^2 - 4)$ c $-3(2n + 1)$
d $-5(x + 8)$ e $-3(x - 9)$ f $-7(t + 2)$ g $-2(m^2 + 2)$ h $-5(m^2 - 7)$ i $-11(x^2 + 2)$ j $-6(a^2 - 2)$ k $-8(a^2 + 4)$ l $-13(y - 3)$
4 a $-6x(x + 2)$ b $-4x(4x + 1)$ c $-3(2x + 3)$ d $-4y(2x + 1)$ e $-9x^2(x - 3)$ f $-5x(3x + y)$ g $-3(2mn + 1)$ h $-5xy(xy - 5)$
i $-3m(2n - 5m)$ j $-4xy(2z - 1)$ k $-3x(3x + 5)$ l $-x(1 + 3y)$ **5** a $8(a + 2b)$ b $5(a - 5)$ c $4(2x - y)$ d $9(a - b)$ e $8(1 - t)$