MATHEMATICS DEPARTMENT

Workbook

Junior School

Solve problems involving number

Book 2 – weeks 4 to 8

Name: _____

Teacher: _____

Do now:

Easy

1). $\dfrac{2}{5} + \dfrac{2}{5} = —$ 2). $\dfrac{3}{7} + \dfrac{2}{7} = —$ 3). $\dfrac{2}{9} + \dfrac{5}{9} = —$

Harder:

1). $\dfrac{1}{4} + \dfrac{3}{5} = —$ 2). $\dfrac{2}{3} + \dfrac{4}{7} = —$ 3). $\dfrac{7}{10} + \dfrac{2}{3} = —$

4). $\dfrac{5}{6} + \dfrac{3}{4} = —$ 5). $\dfrac{1}{4} + — = \dfrac{7}{12}$ 6). $\dfrac{3}{5} + \dfrac{1}{2} = —$

6.1 SOLVING NUMBER PROBLEMS IN A WORD CONTEXT – ADDITION, SUBTRACTION, MULTIPLICATION, DIVISION

Addition and Subtraction

Word Problems

1) Sally has 115 books. Jessica has 122 books.
How many books do they have together ?   _____

2) Melanie's high school played 799 football games this year. She attended
231 games. How many football games did Melanie miss ?   _____

3) Tom picked 112 pears and Keith picked 127 pears from the pear tree.
How many pears were picked in total ?   _____

4) Melanie had 967 nickels in her bank. She spent 181
of her nickels. How many nickels does she have now ?   _____

5) Sally grew 116 carrots. Sandy grew 131 carrots. How many
carrots did they grow in all ?   _____

6) Sandy found 818 seashells on the beach. she gave Sara 159 of
the seashells. How many seashells does she now have ?   _____

7) Melanie has 672 black balloons, she gave Mary 407 of the balloons.
How many black balloons does she now have ?   _____

8) There are 118 rulers in the drawer. Alyssa placed 116 more
rulers in the drawer. How many rulers are now there in total ?   _____

9) Tom has 936 Pokemon cards. Fred bought 312 of Tom's
Pokemon cards. How many Pokemon cards does Tom have now ?   _____

10) There are 134 oak trees currently in the park. Park workers will plant
138 more oak trees today. How many oak trees will the park have
when the workers are finished ?   _____

Multiplication

1) Sara, Mary, Alyssa, and Dan each have 49 baseball cards.
How many baseball cards do they have in all ?   _____

2) Joan has 13 violet balloons. Keith has 8 times more violet balloons than Joan.
How many violet balloons does Keith have ?   _____

3) Melanie has saved 13 quarters from washing cars.
How many cents does Melanie have ?   _____

4) There are 47 children in the classroom, each student will get 25 pencils.
How many pencils will the teacher have to give out ?   _____

5) There were a total of 3 football games a month. The season is played for
4 months. How many football games are in the seasons ?   _____

6) Alyssa has 3 dozen golf balls.
How many golf balls does she have ?   _____

7) Sally has 12 books. Nancy has 8 times more books than
Sally. How many books does Nancy have ?   _____

8) Sam bought 8 dozen eggs from the grocery store to bake some cakes.
How many eggs did Sam buy ?   _____

9) Joan earns $12.50 an hour cleaning houses. If she works from 8:00am to 1:00pm,
how much money will she make ?   _____

10) There are 49 calories in a candy bar. How many
calories are there in 26 candy bars ?   _____

Division

1) Mary earns $35 cleaning a home. How many homes did she clean,
if she made 315 dollars?   _____

2) Joan has saved 1100 cents from selling lemonade.
How many dollars does Joan have?   _____

3) There were a total of 160 football games in the season.
The season is played for 16 months. How many football games were played
each month, if each month has the same number of games?   _____

4) Jason has 315 yellow balloons. Jason has 45 times
more yellow balloons than Benny. How many yellow balloons does Benny have?   _____

5) Sam has 60 muffins, which he needs to box up
into dozens. How many boxes does he need?   _____

6) Dan bought 675 crayons that came in packs of 15.
How many packs of crayons did Dan buy?   _____

7) Jessica's shelves hold 26 books each. How many shelves will Jessica need if
Jessica has 130 books?   _____

8) Tom, Melanie, Sandy, and Tim each bought 400 baseball cards,
which come in packs of 20. How many packs of baseball cards do they have in all?   _____

9) There are 1290 students at a school. If each
classroom holds 30 students, how many classrooms are needed at the school?   _____

10) A teacher has 264 pieces of candy. If there are 33
students, and the candy is divided evenly, How many pieces will each student get?   _____

Mixed operations

1. In January, a bolt factory made 23,945 bolts. In February, the factory made 22,566 bolts and in March 29,567 bolts. How many bolts did the factory make in the first 3 months of the year?

2. Auntie Gracie was born in 1936 and got married in 1962. How old was she when she got married?

3. There are 22 biscuits in each packet. A carton contains 24 packets of biscuits. A truck can carry 250 boxes. How many biscuits can the box carry?

4. There are 450,785 people who live in the city of Townay. The city has 55 doctors. If each doctor has the same number of patients, how many patients does each doctor have?

5. Hongi Hika, the famous chief of the Nga Puhi, was born in Kaikohe in 1772 and died in Whangaroa in 1828. How old was Hongi Hika when he died?

6. The shortest distance from NZ to the UK is 18, 389 km. An electric car can travel 424 km between battery charges. If it were possible to drive by the shortest route, how many times would the car's battery need to be re-charged en-route?

7. Tane went shopping. He bought 2 shirts costing $55.99 each, a hoodie which cost $100.56 and visited a café where he bought a chocolate muffin for $5.20 and a vanilla milkshake for $3.50. Tane started with $300. How much money did he have at the end of his shop.

6.2 SOLVING NUMBER PROBLEMS IN A WORD CONTEXT – INTEGER OPERATIONS

Do Now:

Convert these mixed numbers into improper fractions. The answers should be in simplest form.

1) $3\dfrac{2}{3}$ = ——

2) $4\dfrac{1}{4}$ = ——

3) $2\dfrac{3}{7}$ = ——

4) $9\dfrac{1}{2}$ = ——

5) $5\dfrac{3}{4}$ = ——

6) $7\dfrac{1}{5}$ = ——

7) $4\dfrac{5}{6}$ = ——

8) $2\dfrac{2}{3}$ = ——

9) $3\dfrac{9}{10}$ = ——

10) $6\dfrac{5}{7}$ = ——

11) $8\dfrac{3}{10}$ = ——

12) $4\dfrac{7}{8}$ = ——

Integer word problems

1. Mt. Everest, the highest elevation in Asia, is 29,028 feet above sea level. The Dead Sea, the lowest elevation, is 1,312 feet below sea level. What is the difference between these two elevations?

2. In Dunedin, the temperature was ⁻5° in the morning. If the temperature dropped 4°C, what is the temperature now?

3. A submarine was situated 300 metres below sea level. If it ascends 78 metres, what is its new depth?

4. Maggie owes the candy store $35. Each of 5 friends will help her pay off her debt. How much will each friend pay?

5. Roman Civilization began in 509 B.C. and ended in 476 A.D. How long did Roman Civilization last?

6. Lilly bought 4 pairs of blue jeans at $32 each. How much money did she pay the clerk?

7. A different submarine was situated 450 metres below sea level. If it ascends 212 metres, what is its new position?

8. In the Sahara Desert one day it was 49°C. In the Gobi Desert a temperature of -23°C was recorded. What is the difference between these two temperatures?

9. The Punic Wars began in 264 B.C. and ended in 146 B.C. How long did the Punic Wars last?

10. Metal mercury at room temperature is a liquid. Its melting point is ⁻39°C. The freezing point of alcohol is⁻114°C. How much warmer is the melting point of mercury than the freezing point of alcohol?

7.1 FRACTIONS TO PERCENTAGES

Convert Decimal to Percent

0.221 =   0.32 =   0.448 =

0.159 =   1.79 =   1.93 =

0.148 =   1.81 =   0.23 =

0.24 =   0.09 =   0.985 =

1.77 =   1.63 =   0.426 =

Convert Fraction to Percent

$\frac{13}{16}$ = $\frac{5}{25}$ = $\frac{5}{8}$ =

$\frac{1}{10}$ = $\frac{43}{25}$ = $\frac{7}{40}$ =

$\frac{15}{25}$ = $\frac{17}{20}$ = $\frac{5}{10}$ =

$\frac{59}{50}$ = $\frac{7}{8}$ = $\frac{27}{20}$ =

$\frac{1}{8}$ = $\frac{1}{8}$ = $\frac{12}{10}$ =

1). $\frac{7}{10}$ 2). $\frac{10}{50}$ 3). $\frac{5}{20}$ 4). $\frac{6}{10}$ 5). $\frac{9}{20}$

6). $\frac{7}{50}$ 7). $\frac{3}{25}$ 8). $\frac{12}{20}$ 9). $\frac{9}{25}$ 10). $\frac{3}{4}$

11). $\frac{2}{5}$ 12). $\frac{17}{20}$ 13). $\frac{22}{25}$ 14). $\frac{19}{20}$ 15). $\frac{1}{4}$

16). $\frac{1}{2}$ 17). $\frac{17}{25}$ 18). $\frac{46}{50}$ 19). $\frac{13}{20}$ 20). $\frac{38}{50}$

21). $\frac{34}{50}$ 22). $\frac{14}{25}$ 23). $\frac{18}{20}$ 24). $\frac{3}{10}$ 25). $\frac{1}{5}$

26). $\frac{28}{50}$ 27). $\frac{11}{20}$ 28). $\frac{15}{25}$ 29). $\frac{41}{50}$ 30). $\frac{1}{10}$

1). $\dfrac{1}{8}$ 2). 0.6 3). $\dfrac{2}{5}$ 4). $\dfrac{5}{8}$ 5). 0.24

6). 0.73 7). $\dfrac{1}{3}$ 8). $\dfrac{5}{12}$ 9). 1.45 10). $\dfrac{11}{12}$

11). $\dfrac{2}{3}$ 12). 0.05 13). 1.25 14). 0.73 15). $1\dfrac{1}{2}$

16). 0.01 17). $\dfrac{8}{9}$ 18). $\dfrac{11}{12}$ 19). $1\dfrac{3}{4}$ 20). 1.75

21). $\dfrac{1}{6}$ 22). 0.71 23). 2.07 24). $\dfrac{5}{9}$ 25). $\dfrac{4}{7}$

26). $\dfrac{9}{10}$ 27). 0.16 28). $1\dfrac{7}{10}$ 29). $\dfrac{7}{20}$ 30). $\dfrac{4}{25}$

31). 0.64 32). $1\dfrac{5}{6}$ 33). $2\dfrac{1}{4}$ 34). $\dfrac{7}{40}$ 35). $\dfrac{9}{11}$

36). $\dfrac{1}{7}$ 37). 0.09 38). 2.19 39). $2\dfrac{3}{25}$ 40). $1\dfrac{11}{20}$

Write the following as fractions with 100 on the denominat

1). $\dfrac{1}{4} = \dfrac{}{100}$ 2). $\dfrac{1}{10} = \dfrac{}{100}$ 3). $\dfrac{9}{25} = \dfrac{}{100}$ 4). $\dfrac{4}{10} = \dfrac{}{100}$ 5). $\dfrac{12}{20} = \dfrac{}{100}$

6). $\dfrac{24}{50}$ 7). $\dfrac{4}{20}$ 8). $\dfrac{4}{5}$ 9). $\dfrac{7}{20}$ 10). $\dfrac{2}{5}$

11). $\dfrac{7}{10}$ 12). $\dfrac{15}{20}$ 13). $\dfrac{7}{25}$ 14). $\dfrac{9}{20}$ 15). $\dfrac{3}{4}$

16). $\dfrac{3}{25}$ 17). $\dfrac{45}{50}$ 18). $\dfrac{9}{10}$ 19). $\dfrac{27}{50}$ 20). $\dfrac{3}{5}$

21). $\dfrac{34}{50}$ 22). $\dfrac{24}{25}$ 23). $\dfrac{18}{20}$ 24). $\dfrac{3}{10}$ 25). $\dfrac{1}{5}$

26). $\dfrac{28}{50}$ 27). $\dfrac{11}{20}$ 28). $\dfrac{19}{20}$ 29). $\dfrac{49}{50}$ 30). $\dfrac{17}{20}$

D. Finding a Percentage.

Where necessary leave the answers to **1 decimal place**. Find

1). 15 as a percentage of 60

2). 120 as a percentage of 600

3). 200 as a percentage of 2000

4). 30 as a percentage of 60

5). 80 as a percentage of 200

6). 60 as a percentage of 300

7). 74 as a percentage of 200

8). 42 as a percentage of 168

9). 112 as a percentage of 160

10). 42 as a percentage of 56

11). 36 as a percentage of 50

12). 132 as a percentage of 150

13). 216 as a percentage of 360

14). 45 as a percentage of 225

15). 189 as a percentage of 420

16). 222 as a percentage of 370

17). 6 as a percentage of 150

18). 324 as a percentage of 360

19). 45 as a percentage of 60

20). 153 as a percentage of 180

21). 598 as a percentage of 920

22). 342 as a percentage of 380

23). 80 as a percentage of 320

24). 224 as a percentage of 400

25). 48 as a percentage of 192

26). 36 as a percentage of 288

27). 183 as a percentage of 600

28). 54 as a percentage of 144

29). 170 as a percentage of 400

30). 33 as a percentage of 264

31). 21 as a percentage of 40

32). 27 as a percentage of 250

33). 65 as a percentage of 200

34). 25 as a percentage of 40

35). 48 as a percentage of 128

36). 220 as a percentage of 480

37). 80 as a percentage of 150

38). 5 as a percentage of 80

39). 48 as a percentage of 350

40). 50 as a percentage of 225

41). 56 as a percentage of 90

42). 72 as a percentage of 92

43). 140 as a percentage of 360

44). 472 as a percentage of 500

45). 46 as a percentage of 73

46). 600g as a percentage of 1Kg

47). 30cm as a percentage of 2m

48). 450mm as a percentage of 1.5m

49). 12mins as a percentage of 2 hrs

50). 3p as a percentage of £1.50

51). 15mm as a percentage of 6cm

52). 340mm as a percentage of 85cm

53). 450m as a percentage of 2Km

54). 12cm as a percentage of 2m

55). 320ml as a percentage of 4 litres

56). 10 hrs as a percentage of 2 days

57). 2 ft as a percentage of 4yds

58). 480m as a percentage of 1.4Km

59). 90ml as a percentage of 5 litres

60). 80mg as a percentage of 6g

You Do, word problems:

Worded Questions.

1). In a school of 400 pupils, 250 are girls. What percentage are girls ?

2). In a crate of apples 33 are bad. The crate holds 264 apples. What percentage are bad ?

3). A boy gets 29 marks out of 50 in his maths exam. What percentage did he score ?

4). A farmer has 350 birds, of which 140 are ducks. What percentage of ducks does he have ?

5). In a class of 40 children 24 are girls. What percentage are girls ?

6). In September it rained for 15 days. What percentage of days did it rain for ?

7). The captain of a football team scored 17 out of the 85 goals they scored that season. What percentage of the goals did he score ?

8). In the last maths test 18 out of 54 pupils failed. What percentage of pupils failed ?

9). In a general election in Numberland where 6400 people live. 2560 voted labour, 1600 voted Conservative, 1920 voted Liberal and 320 did not vote. Find what percentage of people voted for each party.

10). In a box of 500 eggs 32 were broken. What percentage of eggs were broken ?

11). On a Friday night 18 pupils were in detention from a school of 800 pupils. What percentage of the school were in detention that Friday night ?

12). 360 buses run from a depot, but 72 are being repaired. What percentage of the total are in service ?

13). One day 132 trains arrive at a railway station and 99 are on time. What percentage of them are late ?

14). In an exam a pupil gets 54 out of 72 marks. What percentage of the exam does he get wrong ?

15). A dentist looks at Jean's 32 teeth, 12 of them have fillings. What percentage don't have fillings ?

16). Billy has 250 school meals in a year. He has chips for 195 meals. What percentage of school meals does Billy not have chips ?

17). In a classroom there are 18 girls and 14 boys. What percentage in the classroom are girls ?

18). A farmer has 120 sheep and 180 cows. What percentage of these animals are cows ?

19). For her birthday Beth gets 6 presents wrapped in red paper and 14 presents wrapped in blue paper. What percentage of her presents are wrapped in red paper ?

20). Alex has 3 dolls, 12 teddy bears and 5 cuddly toys. What percentage of these are
   a). teddy bears,   b). dolls,   c). cuddly toys ?

21). In a popularity vote, Hazel gets 65 votes, Nigel 40 votes, Billy 90 votes and Lynne 105 votes. Find what percentage of the vote each person received.

22). Only three people in the hockey team scored last season. Hayley scored 9, Sam scored 15 and Hazel scored 1 goal. What percentage of the goals did each score ?

23). Bertie collects leaves. He has 2000 in total. He has 700 green leaves, 500 red leaves and 800 mouldy leaves.
   a).   What percentage are red leaves ?
   b).   What percentage are **not** mouldy leaves ?
   c).   What percentage are **not** green leaves ?

24). At the zoo there are 5 ice-cream kiosks. The first sold 900 ice-creams, the second 350 ice-creams, the third 450 ice-creams, the fourth 1050 ice-creams and the fifth 700 ice-creams. Find the percentage of ice-creams sold at each kiosk.

7.2   PERCENTAGE OF AN AMOUNT AND GST

Do Now:

1. $0.5 =$ _____

2. $0.45 =$ _____

3. $0.9 =$ _____

4. $0.31 =$ _____

5. $0.94 =$ _____

6. $0.7 =$ _____

7. $0.2 =$ _____

8. $0.02 =$ _____

9. $0.4 =$ _____

10. $0.6 =$ _____

11. $0.77 =$ _____

12. $0.11 =$ _____

13. $0.61 =$ _____

14. $0.39 =$ _____

15. $0.8 =$ _____

16. $0.3 =$ _____

17. $0.33 =$ _____

18. $0.44 =$ _____

1)	30% of 20 =		21)	150% of 240 =
2)	2% of 800 =		22)	400% of 15 =
3)	25% of 24 =		23)	25% of 36 =
4)	7% of 500 =		24)	15% of 60 =
5)	50% of 38 =		25)	45% of 80 =
6)	70% of 40 =		26)	8% of 200 =
7)	6% of 1000 =		27)	35% of 1000 =
8)	75% of 80 =		28)	75% of 16 =
9)	4% of 300 =		29)	55% of 40 =
10)	30% of 300 =		30)	80% of 300 =
11)	9% of 200 =		31)	45% of 80 =
12)	25% of 40 =		32)	90% of 150 =
13)	80% of 10 =		33)	4% of 250 =
14)	3% of 2000 =		34)	15% of 120 =
15)	50% of 254 =		35)	25% of 48 =
16)	200% of 135 =		36)	95% of 100 =
17)	60% of 200 =		37)	50% of 1284 =
18)	7% of 600 =		38)	10% of 365 =
19)	2% of 900 =		39)	45% of 60 =
20)	90% of 50 =		40)	8% of 1200 =

To find 12 % of £4.00

We can say 12% of £1.00 is 12p

therefore 12 % of £4.00 is 4 times as much

12 % of £4.00 is 4 x 12p = **48p**

B). Use this method to work out :-

1). 8 % of £3.00	2). 6 % of £5.00	3). 3 % of £9.00
4). 10 % of £2.00	5). 9 % of £2.00	6). 4 % of £8.00
7). 2 % of £10.00	8). 7 % of £11.00	9). 10 % of £5.00
10). 6 % of £4.00	11). 9 % of £7.00	12). 12 % of £3.00
13). 11 % of £9.00	14). 8 % of £12.00	15). 6 % of £12.00
16). 21 % of £2.00	17). 15 % of £3.00	18). 43 % of £2.00
19). 53 % of £2.00	20). 22 % of £4.00	21). 31 % of £3.00
22). 64 % of £2.00	23). 34 % of £2.00	24). 92 % of £2.00
25). 20 % of £6.00	26). 13 % of £4.00	27). 83 % of £2.00
28). 98 % of £4.00	29). 15 % of £10.00	30). 38 % of £3.00
31). 64 % of £2.00	32). 34 % of £2.00	33). 92 % of £2.00
34). 20 % of £12.00	35). 19 % of £5.00	36). 63 % of £4.00
37). 71 % of £3.00	38). 40 % of £9.00	39). 70 % of £11.00

1 Work out the following.

a 70% of 50 b 32% of 600

c 24% of 300 d 5% of 200

e 42% of $12 f 60% of $18

g 7% of 33 m h 2.5% of $460

2 A soccer player scores with 40% of his shots at goal. He shoots for goal 30 times altogether. How many times would you expect him to score?

3 A church asks its members pay a 'tithe' of 10% of their income. How much would a member with an income of $85 000 pay?

4 A serious drought affected kiwifruit production this year. The total weight of fruit at one orchard was only 70% of last year's figure, 6500 kg. Calculate the total weight produced this year.

5 These are instructions for mixing concrete: the amount of cement added to the mixture should be 30% of the weight of gravel. How much cement should be added to 150 kg of gravel?

6 Membership fees for senior citizens at a social club are 80% of the fee charged to ordinary members. The fee for ordinary members is $90. How much do senior citizens pay?

7 A can of fly-spray was tested on 2000 flies. 87% of the flies were killed. How many survived?

8 The government pays some retired people a pension of 60% of the average wage after tax. The average wage after tax is $56 500. Calculate the amount of the pension.

9 The owners of a hall hire it out for social events. They charge 15% of the total entrance fees taken. The hall has been hired out for a dance, and the total entrance fees were $1200. Calculate how much the owners should receive.

10 A market gardener in Pukekohe has a land-holding of 15.7 ha. He uses 36% of his land for growing onions. How many hectares are used for growing onions?

11 In a plumber's business 27% are 'repeat' customers and the rest are 'first-time' customers. If the business has 1300 customers altogether, how many are 'first-time' customers?

12 A Year 9 class were given 230 raffle tickets to sell. They sold 100% of them. How many were left?

13 A family puts aside 28% of their income on their mortgage, and puts another 9% into savings. If their income is $73 000, how much money is available for *other* items?

14 A telephone company surveyed 2400 customers to find out if they were satisfied with the service. A year later, they repeated the survey, this time with another 2400 customers. In the first survey, 27% were not satisfied, while in the second survey 19% were not satisfied. How many fewer customers were not satisfied in the second survey compared with the first survey?

15 A white 'Farmers Loaf' weighs 750 g. The label on the packet says: 'Contains a maximum of 2.6% fat and a minimum of 2.5% dietary fibre'.
   a What is the greatest weight of fat that would be in the loaf?
   b What is the least weight of dietary fibre that would be in the loaf?

Percentages codebreaker - Green

A	B	C	D	E	F	G	H	I	J	K	L	M
1.2	120	20	1.3	30	24	2	10	50	48	12	3.5	35

N	O	P	Q	R	S	T	U	V	W	X	Y	Z
7	5	9	13	18	2.4	15	3.4	11	34	32	31	45

Crack the code to find out why my uncle was fired from the calendar factory....

1% OF 1000	50% OF 60		25% OF 60	10% OF 50	25% OF 20	5% OF 240		10% OF 12		50% OF 40	1% OF 500	1% OF 340	5% OF 180	25% OF 14	10% OF 300

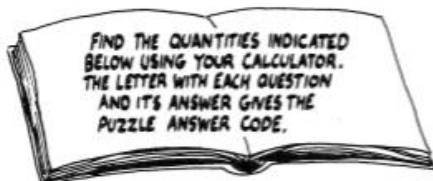|	50% OF 10	10% OF 240		10% OF 13	1% OF 1200	25% OF 124	100% OF 2.4		5% OF 100	1% OF 2400	5% OF 480

Percentage of an Amount Crossnumber

Across
1. 75% of 196
3. 50% of 68
4. 25% of 104
6. 25% of 340
7. 75% of 48
9. 50% of 52
10. 25% of 180
11. 75% of 28
13. 50% of 190
14. 200% of 14
16. 150% of 42
17. 120% of 280

Down
1. 20% of 70
2. 10% of 720
3. 70% of 50
5. 30% of 210
6. 40% of 215
8. 20% of 3025
9. 80% of 340
10. 90% of 50
12. 60% of 20
13. 15% of 620
15. 35% of 240
16. 55% of 120

88

Funny authors

FIND THE QUANTITIES INDICATED BELOW USING YOUR CALCULATOR. THE LETTER WITH EACH QUESTION AND ITS ANSWER GIVES THE PUZZLE ANSWER CODE.

(a) 27% of $341 =

(b) 64% of 750 g =

(c) 75% of 632 m =

(d) 55% of $160 =

(e) 80% of 643·75 g =

(h) 45% of 1400 m =

(i) 36% of $127 =

(l) 125% of 356 g =

(m) 300% of 37 m =

(n) 8% of $860 =

(o) 19% of 1200 g =

(r) 87·5% of 536 m =

(t) 28·2% of $140 =

(u) 6·5% of 4000 g =

STOMACH PAINS
BY

IIIm 225g $68·90 $92·07 630m

445g 225g $39·48 $39·48

GST QUESTIONS

Add GST to the following amounts by multiplying by 1.15

1. $ 33.64 + GST = _____

2. $1230 + GST = _____

3. $267.22 + GST = _____

4. $16782.33 + GST = _____

5. $ 167.22 + GST = _____

Remove GST from the following amounts by dividing by 1.15

6. $ 45.34 - GST = _____

7. $1654 - GST = _____

8. $367.45 - GST = _____

9. $23456.22 - GST = _____

10. $ 187.22 - GST = _____

7.3   PERCENTAGE INCREASE AND DECREASE

Calculate these increases

1) Increase $80 by 15%

2) Increase 320 by 5%

3) Increase $75 by 35%

4) Increase 250kg by 22%

5) Increase 6.4m by 25%

6) Increase 150ml by 33%

Calculate these decreases

1) Decrease $120 by 15%

2) Decrease 28 by 55%

3) Decrease $45 by 5%

4) Decrease 550kg by 10% 20%

5) Decrease 8.8m by 75%

6) Decrease 2300ml by

Calculate the percentage increase in these questions.

1) From 22kg to 28kg

2) from $330 to $400

3) From 4.5ml to 6.2ml

Calculate the percentage decrease in these questions.

1) From $525 to $480

2) From 10.5kg to 8kg

3) From 36ml to 28ml

Word problems

1) A boxed set of DVDs is marked $40. What is the new price if there is a 30% increase?

2) The price of a $650 bike is discounted by 40%. What is the new price?

3) The price of a trip from Auckland to Whangarei is $80 in winter and is increased by 15% in summer. What is the summer price?

4) A giant Easter Egg cost $18 before Easter and was discounted by 45% after. What was the after Easter price?

5) A 15cm wide suitcase can be expanded by 20%. What is the width of the expanded suitcase?

6) A lounge suite marked $4500 is discounted by 60%. What is the sale price?

7) The median price of a house in Massey was $350 000 in 2013. By 2020 it had increased in value by 85%. What is the median house price in Massey in 2020?

8) Petrol increased in price from $1.99 to $2.22 in 2 years. What is the percentage increase?

9) The movie ticket was $22. With a voucher it was $14. What was the percentage discount?

10) Christmas wrapping paper is $5. After Christmas it is on sale for $1. What is the percentage discount?
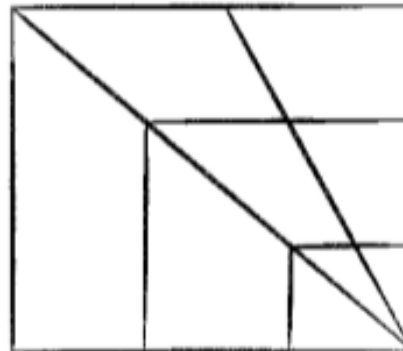
CROSS NUMBER
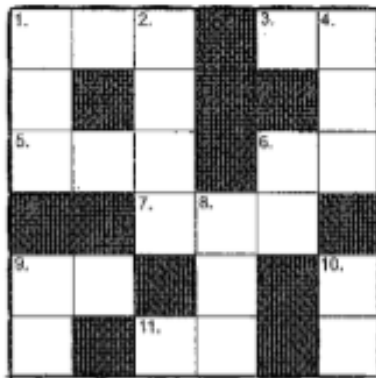
Across

1. Increase 320 by 20%
3. Convert $\frac{7}{20}$ to a percentage.
5. Find 60% of 420
6. Increase 50 by 12%
7. Find 75% of 580
9. Find 65% of 80
11. Find 60% of 40

Down

1. Find 40% of 955
2. Increase 3840 by 10%
4. Increase 440 by 15%
6. Find 250% of 22
8. Reduce 380 by 20%
9. Reduce 70 by 20%
10. Find 60% of 75

PUZZLE

How many triangles can you see in the large square?

34 P WHAT'S A POLYGON?

1	2	3	1	2	4	1	5	5	6	7

Calculate the amount of money resulting from each of the changes below. Draw a straight line connecting the question to its answer on the right. Each line will pass through a number and letter giving the puzzle code.

Increase $50 by 18% •

Decrease $110 by 20% •

Increase $72 by 30% •

Decrease $80 by 30% •

Increase $40 by 71% •

Decrease $175 by 18% •

Increase $95·60 by 25% •

Decrease $123 by 18% •

Increase $78 by 150% •

Decrease $85·80 by 5% •

Increase $42 by 82% •

Decrease $96 by 12½% •

Increase $64·26 by 66⅔% •

Decrease $800 by 91% •

⑤ ⓇR

ⓁL ⒹD ⓃN

⑪ ⑧

ⓎY ④ ②

ⓅP ① ⑫ ⑨

⑬ ⓂM

⑩ ⑥

ⓄO

ⒶA ⓌW

ⒼG

ⒾI ⒺE

⑭ ⑦ ⓉT

③

• $88

• $148·78

• $84

• $100·86

• $93·60

• $107·10

• $59

• $68·40

• $81·51

• $119·50

• $72

• $56

• $76·44

• $187·50

Percentage Increase/ Decrease

1. Increase £200 by the following amounts:

a) 10%   b) 20%   c) 40%   d) 50%   e) 60%   *f) 15%   *g) 35%

2. Decrease £400 by the following amounts:

a) 10%   b) 30%   c) 50%   d) 80%   e) 90%   *f) 5%   *g) 45%

3. Increase £250 by the following amounts:

a) 40%   b) 80%   c) 50%   d) 100%   e) 70%   *f) 25%   *g) 75%

4. Decrease £80 by the following amounts:

a) 20%   b) 60%   c) 80%   d) 30%   e) 25%   *f) 15%   *g) 85%

5. Increase/ Decrease £40 by the following amounts (+ means increase, - means decrease)

a) +30%   b) -10%   c) +60%   d) -30%   e) -80%   *f) +35%   *g) -45%

Extension exercise

ACROSS

1. 6 is 50% of _____

2. 9 is 50% of _____

3. 5 is 25% of _____

5. 7 is 20% of _____

6. 3 is 20% of _____

7. 7 is 25% of _____

8. 13 is 50% of _____

9. 9 is 20% of _____

11. 6 is 25% of _____

12. 110 is 200% of _____

DOWN

1. 30 is 200% of _____

2. 1 is 10% of _____

3. 75 is 300% of _____

4. 15 is 20% of _____

5. 19 is 50% of _____

6. 4 is 25% of _____

7. 12 is 50% of _____

8. 100 is 400% of _____

9. 11 is 25% of _____

10. 45 is 300% of _____

Practice Checkpoint percentages (A)

1. Change 0.65 into a percentage	
2. Write 3.7 as a percentage	
3. Write $\dfrac{5}{8}$ as a decimal	
4. Write $\dfrac{5}{8}$ as a percentage	
5. Change to a percentage 0.17	
6. Change to a percentage $\dfrac{1}{25}$	
7. Write as a decimal 5%	
8. Write as a fraction in simplest form $12\dfrac{1}{2}$ %	
9. Find 15% of 340	
10. Find 90% of $4.50	
11. Increase 240 by 12.5%	
12. Increase $25 by 22%	
13. Decrease 240 by 12.5%	
14. Decrease 360 by 9%	
15. The price went up from $76 to $93. What percentage increase was this?	
16. The shoes cost $220. How much would they cost if there was a discount of 18%	
17. A bill is $356 without GST. How much will the GST be?	
18. If the cost price of a jacket is $80 and 130% profit is added on, what is the selling price?	
19. 30% of the class were chewing gum. 12 were chewing gum. How many were in the class?	
20. A book cost $55 after an increase of 10%. What did it cost originally?	

Real Checkpoint Percentages (B)

1. Change 0.45 into a percentage	
2. Write 7.3 as a percentage	
3. Write ⅖ as a decimal	
4. Write ⅖ as a percentage	
5. Change to a percentage 0.17	
6. Change to a percentage ⅚	
7. Write as a decimal 3%	
8. Write as a fraction in simplest form $12\dfrac{1}{2}$ %	
9. Find 35% of 620	
10. Find 55% of $7.60	
11. Increase 120 by 2.5%	
12. Increase $28 by 72%	
13. Decrease 510 by 37.5%	
14. Decrease 170 by 5%	
15. The price went up from $32 to $43. What percentage increase was this?	
16. The boots cost $188. How much would they cost if there was a discount of 14%	
17. A bill is $274 without GST. How much will the GST be?	
18. If the cost price of a bike is $720 and 110% profit is added on, what is the selling price?	
19. 80% of the class were on time. If 24 were on time, How many were in the class?	
20. A weekly bus pass cost $36.30 after an increase of 10%. What did it cost originally ?	

8.1 SIMPLIFYING AND SPLITTING A NUMBER IN A GIVEN RATIO

Do Now:
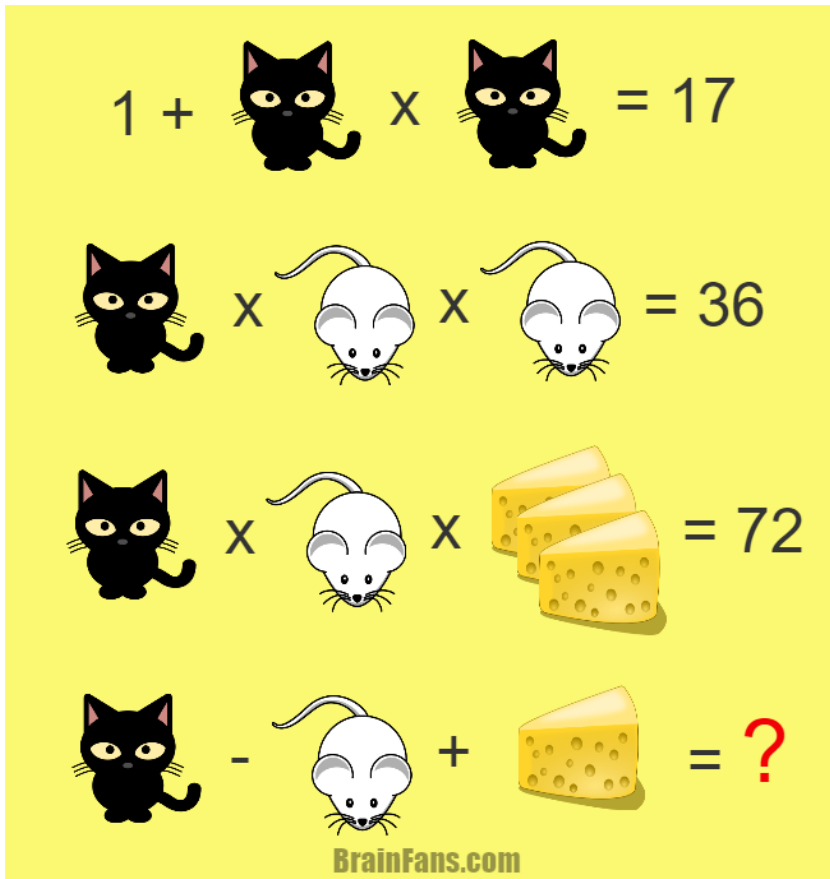
Word questions

At a service-station the car-wash was used 35 times. Fifteen customers paid for a car-wash, and the rest were given out free. What is the ratio of paid car-washes to free car-washes?

In a class of 30 students, eight wear glasses. What is the ratio of students who wear glasses to those who do not wear glasses?

A golf-club treasurer collected $500 in fees one day. $350 was paid by members and the rest by non-members. What was the ratio of money paid by members to money paid by non-members?

Part of a recipe for baking muffins has these instructions: 'for every 2 cups of flour, add half a cup of bran'. What is the ratio of flour : bran in the mixture?

Children start losing their 'milk' teeth at about the age of 6, and they are gradually replaced by 32 adult teeth: 8 incisors, 4 canines, 8 pre-molars, 12 molars (including 4 wisdom teeth). Write down these ratios as simply as possible:

a   incisors : molars   b   pre-molars : canines

A fire-safety officer checks 60 fire-extinguishers one day. Eighteen are faulty and need to be replaced. What is the ratio of faulty fire-extinguishers to satisfactory ones?

Splitting a quantity in a given ratio:

1). A school collected £272 for charity. It was decided to divide the money between Dr. Barnados and the RSPCA in the ratio 3 : 5. How much did each charity receive ?

2). Pocket money is split between Pete, Alan and Helen in the ratio 2 : 3 : 4. Dad pays out £36, how much does each person get ?

3). £54 is split between Arnie, Barney and Clancey in the ratio 3 : 4: 5. How much does each one receive ?

4). Mr. Allen, Mr. Book and Mr. Collins own 4, 5, and 6 parts of a business respectively. The business makes £570 profit in a week. How much does each man get ?

5). The sides of a triangle are in the ratio 2 : 3 : 5. The perimeter is 35 cm. Find the length of each side.

6). Concrete for foundations is made by mixing cement, sand and aggregate in the ratio 1 : 3 : 6. They need 65 cubic feet of concrete. How many cubic feet of cement, sand and aggregate should they use ?

7). John goes to cookery classes and learns the following:

a). To make buttercream you need fat to icing sugar in the ratio 1: 2. He wants to make 276 g of buttercream. How much of each ingredient does he need ?

b). To make suet you need fat to flour in the ratio 1: 3. He wants to make 520 g of suet. How much of each ingredient does he need ?

c). To make bread you need yeast to flour in the ratio 1: 60. He wants to make 1220 g of bread. How much of each ingredient does he need ?

d). To make puff pastry you need fat to flour in the ratio 3: 4. He wants to make 385 g of puff pastry. How much of each ingredient does he need ?

e). To make choux pastry you need butter to flour in the ratio 3: 5. He wants to make 760 g of choux pastry. How much of each ingredient does he need ?

8). £52.50 is split between Alex, Beth and Chloe in the ratio 3 : 5 : 7. How much does each one receive ?

9.1 LOWEST COMMON MULTIPLE (LCM), LOWEST COMMON FACTOR (LCF) AND FACTOR TREES

Te Arawa's Landing in Aotearoa

Some accounts say that Te Arawa was the largest *waka[1]* that came to Aotearoa[2] from Hawaiki[3]. It was a *waka hourua[4]* with a *whare[5]* built on it. It reached Aotearoa at the eastern end of Waiariki[6]. What was the first action Te Arawa's crew decided to do after unloading their *waka*? To answer the question, write down the first five multiples of the given numbers and find the lowest common multiple (LCM). The LCM and the letter next to it will give the puzzle code.

18 __ __ __ __ __ 30 __ __ __ __ __ LCM = H	12 __ __ __ __ __ 16 __ __ __ __ __ LCM = T	24 __ __ __ __ __ 36 __ __ __ __ __ LCM = P
14 __ __ __ __ __ 21 __ __ __ __ __ LCM = Ā	6 __ __ __ __ __ 8 __ __ __ __ __ LCM = Ū	12 __ __ __ __ __ 18 __ __ __ __ __ LCM = E
10 __ __ __ __ __ 15 __ __ __ __ __ LCM = C	9 __ __ __ __ __ 15 __ __ __ __ __ LCM = D	10 __ __ __ __ __ 25 __ __ __ __ __ LCM = T
16 __ __ __ __ __ 20 __ __ __ __ __ LCM = E	4 __ __ __ __ __ 5 __ __ __ __ __ LCM = Y	8 __ __ __ __ __ 10 __ __ __ __ __ LCM = P
5 __ __ __ __ __ 3 __ __ __ __ __ LCM = A	15 __ __ __ __ __ 25 __ __ __ __ __ LCM = C	4 __ __ __ __ __ 6 __ __ __ __ __ LCM = S
14 __ __ __ __ __ 35 __ __ __ __ __ LCM = U	2 __ __ __ __ __ 3 __ __ __ __ __ LCM = T	7 __ __ __ __ __ 14 __ __ __ __ __ LCM = E
6 __ __ __ __ __ 9 __ __ __ __ __ LCM = L	20 __ __ __ __ __ 30 __ __ __ __ __ LCM = R	

6	90	36	20	5	12	14	50	5	70	40	5	15	5	48	24	42	15	90	70

15	5	12	15	30	60	36	45	5	72	18	15	75	80

[1]*Waka* (canoe); [2]*Aotearoa* (New Zealand); [3]*Hawaiki* (the ancient homeland of Māori);
[4]*Waka hourua* (double-hulled canoe); [5]*Whare* (house); [6]Waiariki (the Bay of Plenty);

Find the Lowest Common multiple of the following sets of numbers.

1). 3 and 4   2). 5 and 7   3). 6 and 9   4). 4 and 7
5). 8 and 12   6). 10 and 15   7). 12 and 9   8). 10 and 12
9). 20 and 15   10). 12 and 18   11). 15 and 25   12). 16 and 24
13). 3, 4 and 5   14). 2, 3 and 5   15). 3, 4 and 8   16). 2, 4 and 9
17). 5, 8 and 10   18). 3, 9 and 12   19). 4, 12 and 16   20). 8, 12 and 20
21). 5, 12 and 24   22). 15, 20 and 24   23). 8, 15 and 20   24). 15, 18 and 30.

10.1 RULES OF INDICES POWERS AND FACTORIALS

A.

Simplify and leave in index notation. (Do not try to work out any values).

1).	$9^4 \div 9^2$	2).	$7^5 \div 7^3$	3).	$5^3 \div 5^2$	4).	$6^3 \div 6^1$
5).	$2^5 \div 2^2$	6).	$3^6 \div 3^2$	7).	$2^7 \div 2^4$	8).	$3^6 \div 3^5$
9).	$5^7 \div 5^4$	10).	$4^8 \div 4^3$	11).	$10^4 \div 10$	12).	$9^5 \div 9^2$
13).	$7^6 \div 7$	14).	$15^5 \div 15$	15).	$23^7 \div 23^3$	16).	$4^9 \div 4^3$
17).	$2^{10} \div 2^7$	18).	$3^{15} \div 3^2$	19).	$8^{14} \div 8^6$	20).	$4^{23} \div 4^{14}$

21). Write a generalisation to show how to solve $4^x \div 4^y$.

22).	$7^5 \div 7^5$	23).	$8^2 \div 8^3$	24).	$5^4 \div 5^7$	25).	$6^3 \div 6^8$
26).	$2^3 \div 2^5$	27).	$4^4 \div 4^9$	28).	$4^3 \div 4^7$	29).	$6 \div 6^4$
30).	$8^7 \div 8^7$	31).	$5 \div 5^8$				

B. Simplify and leave in index notation (do not try to work out any values):

1) $(9^3)^7 =$ 2) $(5^3)^4 =$ 3) $(7^3)^2 =$ 4) $(10^5)^2 =$ 5)
$(13^0)^2 =$

C. Simplify

1) $(-49)^0 =$ 2) $(12)^0 + (-12)^0 =$ 3) $(1/6)^0 =$ 4) $(-\,^1/_6)^0 =$

Word questions

Q1

A student has written down, correctly,
$3^{11} = 177\ 147$ in their notes. The student does not have a calculator.

a Explain how the student could work out the value of 3^{12}.
Show working, including the final result.

b Explain how the student could

Q2

A perfect square is a number that can be written as a^2, where
a is a counting number. Examples include 1, 4 and 9.
Use these clues to identify this number:

- I am a perfect square.
- I have two digits.
- The sum of my digits is even.

Factorials

<u>**Practice Problems**</u>

1) $4!$

2) $8!$

3) $7!$

4) $\dfrac{4!}{3!}$

5) $\dfrac{6!}{1!}$

6) $\dfrac{6!}{4!}$

7) $\dfrac{6!}{4!2!}$

8) $\dfrac{5!}{2!2!}$

9) $\dfrac{7!}{3!2!}$

10) $\dfrac{6!}{(5-3)!3!}$

11) $\dfrac{7!}{(7-4)!4!}$

12) $\dfrac{4!}{(4-1)!1!}$

10.2 SQUARE ROOTS, SURDS

(Extension)

Between which two consecutive integers do the following numbers lie?

1).	$\sqrt{31}$	2).	$\sqrt{108}$	3).	$\sqrt{150}$	4).	$\sqrt{205}$
5).	$\sqrt{414}$	6).	$\sqrt{500}$	7).	$\sqrt{761}$	8).	$\sqrt{945}$

Write the following in simplest surd form:
1. $\sqrt{18}$ 2. $\sqrt{56}$

3. $\sqrt{96}$ 4. $\sqrt{60}$

Write these as a single surd then evaluate:

5. $\sqrt{27} \times \sqrt{2}$ 6. $\sqrt{6} \times \sqrt{8} \times \sqrt{3}$

7. $\dfrac{\sqrt{320}}{\sqrt{5}}$

8. $\dfrac{\sqrt{30} \times \sqrt{12}}{\sqrt{2} \times \sqrt{5}}$

Learning Objectives from the New Zealand Curriculum

Level 3

In a range of meaningful contexts, students will be engaged in thinking mathematically and statistically. They will solve problems and model situations that require them to:

Number and Algebra

Number strategies
- Use a range of additive and simple multiplicative strategies with whole numbers, fractions, decimals, and percentages.

Number knowledge
- Know basic multiplication and division facts.
- Know counting sequences for whole numbers.
- Know how many tenths, tens, hundreds, and thousands are in whole numbers.
- Know fractions and percentages in everyday use

Level 4

In a range of meaningful contexts, students will be engaged in thinking mathematically and statistically. They will solve problems and model situations that require them to:

Number and Algebra

Number strategies and knowledge
- Use a range of multiplicative strategies when operating on whole numbers.
- Understand addition and subtraction of fractions, decimals, and integers.
- Find fractions, decimals, and percentages of amounts expressed as whole numbers, simple fractions, and decimals.
- Apply simple linear proportions, including ordering fractions.
- Know the equivalent decimal and percentage forms for everyday fractions.
- Know the relative size and place value structure of positive and negative integers and decimals to three places.

Level 5

In a range of meaningful contexts, students will be engaged in thinking mathematically and statistically. They will solve problems and model situations that require them to:

Number and Algebra

Number strategies and knowledge
- Reason with linear proportions.
- Use prime numbers, common factors and multiples, and powers (including square roots).
- Understand operations on fractions, decimals, percentages, and integers.
- Use rates and ratios.
- Know commonly used fraction, decimal, and percentage conversions.
- Know and apply standard form, significant figures, rounding, and decimal place value.