PUKEKOHE HIGH SCHOOL

Year 9-10 Home Learning Resources

Part I

Term 1 2021

Our teachers are thinking of you.

Use the contents page within to help you work through the hard material work set by our English, Science, Social Studies and Mathematics Departments.

If school returns and you haven't needed to use this book, please store it in a safe place at home for use in the future.

Student Name:_____ **Learning Group:** _____ **Teacher Code:** _____

Contents

English

✍ Writing about a character:

Good writers can make the reader see a real, believable person when they write about a character.

Task 1: What's in a good description?

1a. Rose

Under each section in bold and italics, write what the description is telling us about Rose using the following options:

Action   Looks   What others think   What Rose thinks

Rose was a slender, brown girl, with dark straight hair, cut hard across her forehead.

_____

She was a pretty kid, ***but not as pretty as her mother.*** Well, that's what everyone told her.

_____

She wasn't vain, but ***it stuck in her guts***, having someone telling you that every day of your life.

_____

1b. Fish

Under each section in bold and italics, write what the description is telling us about Rose using the following options:

Action   Looks   What others think   What Fish thinks

… the others call him Samson, or just plain Fish, for his wit and alertness. ***Everyone loves Fish***.

_____

Just by ***dunking a girl's braids in an inkwell*** he can maker her love him.

_____

He endears teachers to him by ***giving them lip***…

_____

 [his brother Quick] knows that ***Fish is smarter and better looking than him,*** and that people love him more.

_____

Task 2: Building a character description?

Good writers create interesting, believable characters. The following tasks will cover techniques that will help you create effective characters in your writing.

What do you see?

Readers should be able to see in their mind what a character looks like. But if you describe *every* detail of a character's appearance, your writing will be boring. It is important to focus on interesting parts of a character's appearance, especially the details that reveal something about personality. We will start putting these ideas into practice by **describing someone you know well**.

2a. Describe what you see

Choose a character from your real life that you know well. You could choose someone in your family, or a good friend.

Fill in the table below. *Examples are provided in brackets for a character called Tom to show you what to do.*

My character's name: *(eg. Tom)*	
Physical detail	**Description**
What physical build does the character have?	*(eg. Tom is tall and thin, with long gangly legs and arms.)* My character:
Describe you character's facial features (eyes, mouth, nose, colouring…)	*(eg. Bright blue eyes that sparkle, a wide smiling mouth with shiny white teeth, pink cheeks with a few freckles on his nose.)* My character:
Describe your character's typical clothing.	*(eg. Long baggy brown shorts with pockets half torn off, a bright T-shirt and an old grey beanie on his head.)* My character:
How does your character move?	*(eg. When Tom walks, he takes big steps and always waves his arms around. He cannot keep still.)* My character:
Does your character have a possession associated with them?	*(eg. Tom always carries a saggy blue backpack with lots of pockets on the outside. It's full of things that might come in handy, like string, a small hammer, batteries and an empty bottle.)* My character:

Using physical details to describe a character

Read the following character description using Tom's details from the table above. The **writer's aim** is to describe Tom as a cheerful, happy and lively character, always on the go.

Tom is tall and thin, with long gangly legs and arms. His bright blue eyes sparkle above a wide smiling mouth. He wears long baggy brown shorts with pockets half torn off, and when he walks, he waves his arms around. He cannot keep still. He always carries a saggy blue backpack full of things that might come in handy, like string, a small hammer, batteries and an empty bottle.

Task 2b: Selecting detail

1. Compare the paragraph describing Tom with the descriptions in the table. Some details have been left out because they don't help the writer's aim, or because they repeat the same sort of detail.

   Write down the **details that have been left out** of the finished character description above.

   _____

   _____

   _____

   _____

2. Go back to the details **you have written** about your character.

   a. What is the **aim** of your description (the kind of person are trying to describe).

   I want to describe my character as

   _____

   _____

   _____

   _____

   _____

   b. Write down the details for your character, using the descriptions you wrote in the table. Make sure the details suit the main aim of your description.

   _____

   _____

   _____

   _____

   _____

c.   Now write your paragraph describing your character using these details.

_____

_____

_____

_____

_____

_____

_____

Writing activity: My Mystery Neighbour

You are going to write a description of someone mysterious who lives somewhere near to you. Create this character and you feel a little frightened of this strange neighbour.

1.   Use the strategies you used to describe a real character in Task 2 to describe a new made up (fictional) character.

Physical detail	Description
What physical build does the character have?	
Describe you character's facial features (eyes, mouth, nose, colouring…)	
Describe your character's typical clothing.	

How does your character move?	
Does your character have a possession associated with them?	

2. Select the details you want to include to create the character of your mysterious neighbour. Remember that you are aiming to make this character seem mysterious and a little frightening.

_____

_____

_____

_____

_____

_____

3. Write the descriptive paragraph of your mysterious neighbour.

_____

_____

_____

_____

_____

_____

_____

_____

Extension tasks

You can do this activity again to describe any of the following characters:

- One of your whaanau – maybe your grandparent or koro and imagine how they were when they were young

- A younger sibling

- Your oldest friend

- A celebrity

Create a song or poem about any of the characters from these activities.

Year 9 Science: Ahurei Aotearoa

The structure of the Earth:

The Earth is made up of a number of layers. The outside layer is the thinnest and is only about 1% of the Earth. It averages at around 25 km deep, which is the same as the distance from Pukekohe to Kariotahi beach. This layer is called the **crust** and is made up of pieces called **tectonic plates**. Next we have the **mantle**, this is the thickest layer of the Earth and is 2,900 km deep, which is the same as the distance between here and Samoa. It sits under the crust and is made up of semi-molten rock called **magma**. The temperature of the mantle near the Earth's crust is between 500 and 900°C, at the boundary with the outer core it is 4000°C. The third layer of the Earth is called the **outer core**, it is liquid iron and is at a temperature of 5000°C. The outer core is 2,300 km thick, the equivalent of here to Brisbane. The final, central layer of the Earth is called the **inner core**, it is made up of iron that is under such intense pressure that even though it is incredibly hot, at 5,200°C, it is solid. It is 1,150 km thick, which is the distance between here and Invercargill.
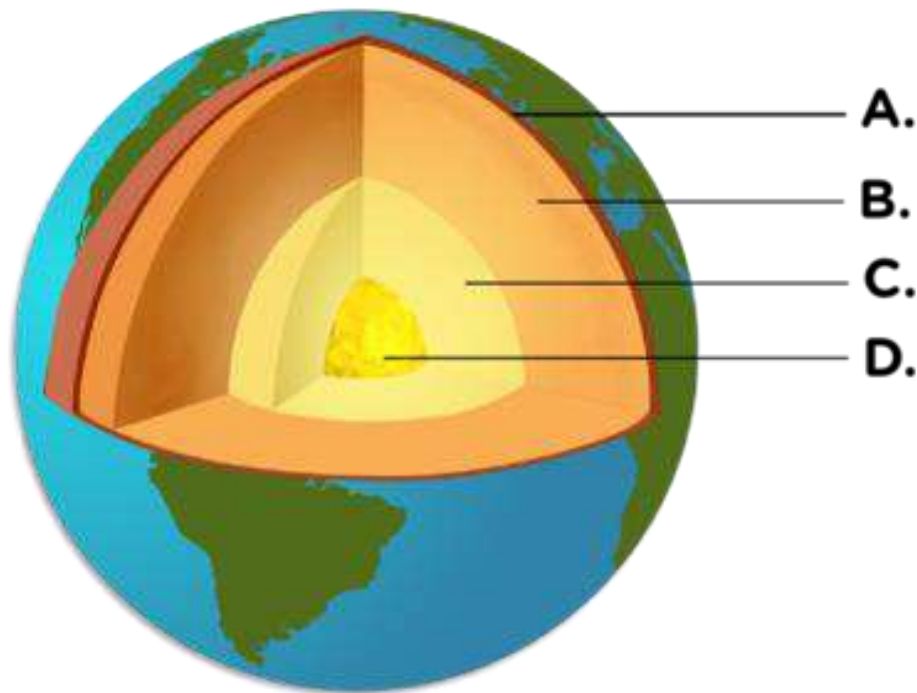
Question 1: Name the layers of the Earth:

A:	
B:	
C:	
D:	

Question 2: Which layer is the:

Hottest?	
Thickest?	
Coldest?	
Thinnest?	

Question 3: Define the following:

Molten	
Magma	

Question 4: The Mantle

What is the temperature of the lower mantle?	
What is the temperature of the upper mantle?	
What happens to the mantle near the core?	
What happens to the mantle near the crust?	
What is the name given to the currents caused by heating and cooling?	

Question 5: The Crust (research)

What are the pieces that make up the crust called?	
How many plates are there on the Earth's surface?	
What are the areas where the plates meet called?	
What activity happens at these places?	
What is the name given to the edge of the Pacific Plate?	

Year 10 Science: Energy and Light

Watch the following videos:
Energy | The Dr. Binocs Show | Educational Videos For Kids:
https://www.youtube.com/watch?v=Q0LBegPWzrg&t=131s
Energy Transformations | Transformation of energy | Examples of energy transfer and transformation:
https://www.youtube.com/watch?v=wGvKjkdbhYA
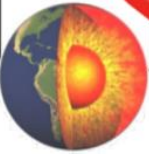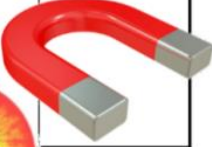
Kinetic energy

Light (radiant) Energy	Sound Energy	Mechanical kinetic Energy	Heat (thermal) Energy	Electrical Energy
Energy traveling in waves, with wavelengths that can be seen by humans.	Sound travels in waves of different pressure. This causes movement of particles. Sound cannot travel in a vacuum.	Movement energy. This can be seen when matter changes its position in space	The kinetic energy that atoms contain. The more they move the more heat they contain. Measured by temperature	Energy contained in electrons. This can either be static like lightning or current electricity that moves in a circuit.

Potential energy

Gravitational Energy	Elastic Energy	Nuclear Energy	Chemical Energy	Geothermal Energy	Magnetic Energy
This is the energy contained by an object which pulls it back to Earth. The further up from the ground the more it contains.	Found in springs, rubber bands etc. The more they are compressed the more energy they contain to make them change back to their original shape	The energy contained by the nucleus of an atom which holds the neutrons and protons together. A lot of energy is released when these are separated in a nuclear reaction	The energy contained in the bonds of chemical molecules – i.e.food or battery acid. When these bonds are broken in a chemical reaction then their energy is released	Energy produced by geological processes of the Earth which causes heat and pressure to rise to the surface.	Energy contained by a magnet to either attract or repel other magnetic objects. It can also cause electrical currents.

1. **Complete the following paragraph about energy by using the correct words from the box below:**

Chemical, Solar, Elastic, Wind, Gravitational, Biomass, Energy, Joule, Heat,   Non-renewable, Fuels, Battery, Electrical, Insulation, Renewable, Potential

There are many different forms of e_____. Scientists call stored energy p_____ energy. Three common forms of potential energy are g_____ (found in objects up high), e_____ (found in springs and rubber bands) and c_____ (found in food and _____ like oil and coal). Energy sources like oil and coal will run out one day and are called n_____ energy sources. Alternative sources of energy like wave action, b_____, s_____ and w_____ are starting to be used more often.

2. **Read the following paragraph and answer the true or false below**

The Law of Conservation says that energy cannot be created or destroyed but can only change form. The total amount of energy always stays the same.
- Energy **transformations** are when energy changes from one form to another, eg: chemical potential energy becomes kinetic energy.
- Energy **transfer** is when the energy type stays the same but it moves from one object to another, eg: someone kicking a ball – their leg has kinetic energy, which is transferred to the ball.
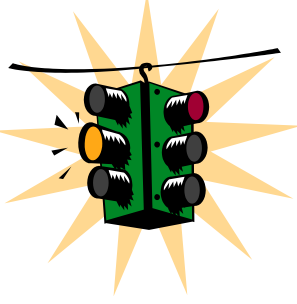- Energy in = energy out.
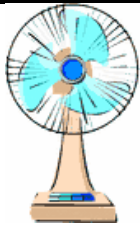- Energy is measured in Joules (J).
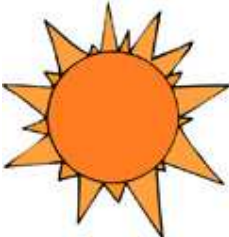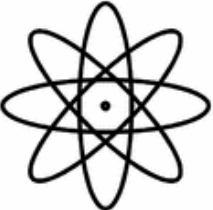
Decide which of the following statements are true or false:

	T/F
Energy can be made	
The total amount of energy transformed by a toaster is less than the amount of electrical energy it uses	
When energy is transferred, it changes to another form	
Sometimes more energy is transformed than was started with	
When a hot water bottle cools down, its heat energy has disappeared	
Energy can change from one form to another	
A machine can convert energy into more than one form	

3. **Name the energy forms in the following situations:**

	Type of energy?
A man at the top of a power pole	
A chocolate bar	
An electrical wire	
A slingshot pulled back	
A can of petrol	
A stove element that has been turned on	
A ringing bell	

4. **Types of energy and energy transformations. Look at each picture and identify the types of energy which are used or can be found in the object. The first one has been done for you.**

Sound Light			

5. **Types of energy – a story.** Read the story below and list all the types of energy you can.

Sally looked out of the window and saw her dad's car pulling into the car park twelve floors below. Before turning away she glanced at the full moon glowing brightly above the city skyline. With one last job to do while her mum and dad caught the lift to her new flat, Sally rushed into the kitchen and using her red oven gloves, removed the hot apple pie from the oven and placed it on the window ledge to cool.
By the time the doorbell rang, Sally had lit the candles on the dining table and was continuing onwards into the hallway before pulling open the front door.
Her mother walked through into the kitchen carrying the bottle of wine they had bought on the way over. She was just in time to see Clumsy the cat knocking the apple pie out of the window. It fell downwards through the cool night air. Mother winced as she heard the splat of the pie hitting the bonnet of her husband's shiny new car.

Type of energy	Object which has it

6. Energy transformation

Writing Energy Transformation Stories
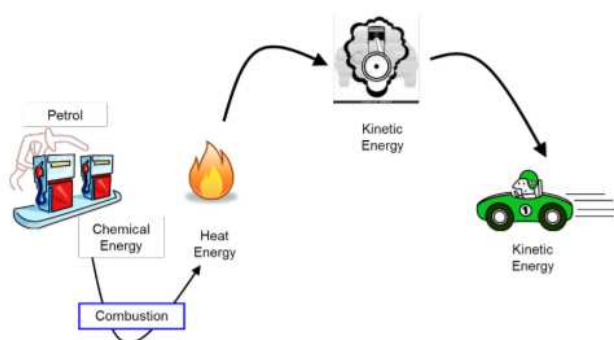
Beside is an example of the energy transformations taking place in a car.

The input energy is **chemical potential** energy from the petrol. This transforms into **heat** energy when it is combusted inside the car energy. Heat energy is then transformed into **kinetic** energy, moving the car engine parts, which also makes the car move along the road.

Step **ONE** Identify what type of input energy you start with: This ball can fall, so we start with Gravitational Potential energy

Step **TWO** as stuff happens, identify what your starting energy changes into: The ball is falling. It now has Kinetic Energy.

Step **THREE** IF anything else happens, identify any further energy transformations: The ball changes shape when it hits the ground, which means it has Elastic Potential energy. It also makes a noise, so it produces Sound Energy.

1. Gravitational Potential Energy changes to Kinetic Energy
2. Kinetic Energy changes to Elastic Potential Energy
3. Elastic Potential Energy changes to Kinetic Energy
4. Kinetic Energy changes to Gravitational Potential Energy
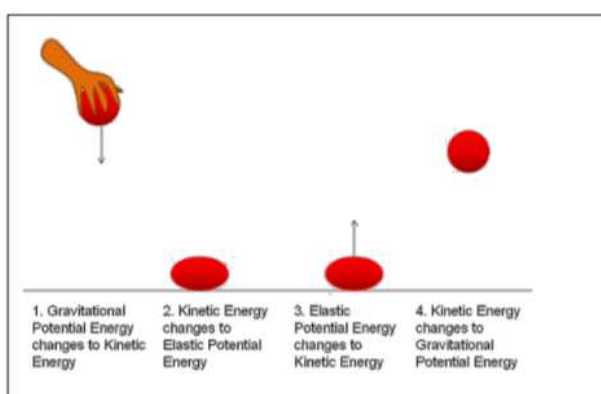
Step **FOUR** Continue if there are further energy transformations: The ball now starts to move upwards so it has Kinetic Energy.

Complete the following energy chain equations to show how energy is transformed from one form to another. You need to use an → to show the energy transformation.
Come up with your own scenarios for the last 4 rows.

Object/scenario	Energy chain equation
A cellphone operating from a battery	**Chemical potential energy → electrical energy → sound + light + heat**
A battery operated torch	
A hand operated wind up torch	
A TV	
A moving car	
A person climbing to the top of the diving board	
A person jumping off the top of the diving board	

Year 10 - Worksheet 1

EQUIVALENT FRACTIONS
Find 3 equivalent fractions for each of the following:

1.	$\frac{1}{4}$		6.	$\frac{3}{7}$
2.	$\frac{1}{3}$		7.	$\frac{4}{9}$
3.	$\frac{1}{5}$		8.	$\frac{5}{8}$
4.	$\frac{2}{3}$		9.	$\frac{5}{7}$
5.	$\frac{3}{4}$		10.	$\frac{5}{6}$

SMALLEST TO BIGGEST
Group these numbers from smallest to largest:

1. 1.01, 1.1, 1.101

2. 2.43, 2.34, 2.034

3. 34.16, 34.016, 34.61

4. 21.27, 21.72, 21.072

5. 13.75, 1.375, 137.6

6. 141.2, 14.12, 14.21

7. 20.71, 207.1, 201.7

8. 0.456, 0.465, 0.645

9. 0.017, 0.0099, 0.071

10. 1.008, 1.010, 1.001

PUZZLE
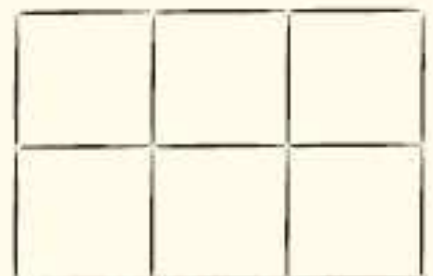
The arrangement above is made of 17 sticks.

Remove 5 sticks to leave 3 squares the same size as the original.

NUMERACY STRATEGIES (ADDITION)

Add by breaking down into powers of 10.

$$\text{e.g. } 38 + 73 = 30 + 8 + 70 + 3$$
$$= 100 + 11$$
$$= 111$$

1. $51 + 19$

2. $23 + 85$

3. $121 + 73$

4. $173 + 24$

5. $135 + 48$

6. $214 + 135$

7. $156 + 281$

8. $1321 + 1525$

9. $2715 + 1272$

10. $1731 + 2256$

5 QUICK QUESTIONS

Use any strategy but not a calculator.

1. $143 + 215$

2. $67 - 34$

3. 31×4

4. $48 \div 6$

5. Round 3.926 to 1 decimal place.

NUMERACY STRATEGIES (MULTIPLICATION)

Multiply by breaking down into easier parts. e.g. 7×14 $= 7 \times (10 + 4)$
$= 7 \times 10 + 7 \times 4$
$= 70 \quad + 28$
$= 98$

1. 8×13

2. 5×14

3. 7×19

4. 6×35

5. 7×45

6. 7×13

7. 3×1421

8. 5×1213

9. 6×1314

10. 9×333

5 QUICK QUESTIONS

Use any strategy but not a calculator.

1. $-2 + -3$

2. -2×-3

3. $\frac{2}{5} + \frac{1}{5}$

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

5. $\frac{2}{3} \div \frac{1}{5}$

REMEMBER LAST YEAR'S WORK

Which is the most sensible statement? Choose from the 4 alternatives.

1. Keith's 20 year old brother is (1.2), (1.8), (2.6) or (6) metres tall.

   _____

2. Samantha's baby sister weighs (30 gms), (300 gms), (3 kg) or (30 kg)?
    Her older sister weighs (30 gms), (300 gms), (3 kg) or (30 kg)?

   _____

3. Wayne's car averages 9.5 litres of fuel for every 100 km travelled. On his holiday
    he expects to drive 700 km and estimates he will need about ($30), ($60), ($90),
    ($120) for petrol which costs $1.80 per litre.

   _____

Calculate the answers to the following:

4. George sets off on a training ride at 1.50pm and cycles for 4½ hours. What time
    did he stop?

   _____

5. A plane is due to leave Wellington Airport at 20:50 and arrive at its destination at
    03:05 the next day. It actually arrives 45 minutes early.
    At what time does it arrive?

   _____

NUMBER APPLICATIONS

1. A team in the Australian soccer league has 17 points. They have played 15
    games. For a win there is 3 points, for a draw there is 1 point.

    What are the various combinations (of Win, Draw or Lose) that would have
    summed to 17?

    _____

    _____

    _____

    _____

Year 10 - Worksheet 2

INVESTIGATION
The shape on the right is made from two same sized equilateral triangles. What fraction is shaded?
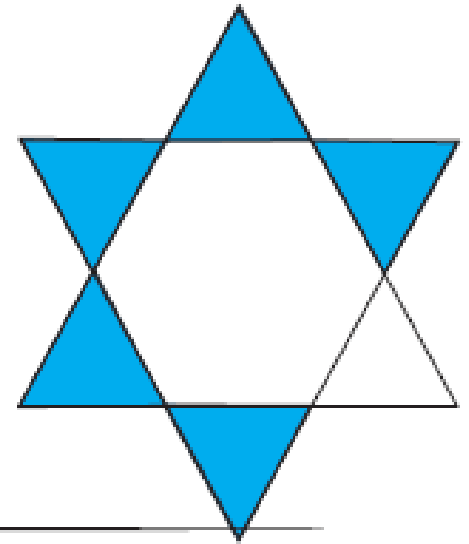
ESTIMATION
Estimate the answers to the following. No calculators.

1. 2.1×7

2. 14.9×10

3. 294×3

4. 13.9×5

5. 1.93×1.1

6. 2.73×3.9

7. $699 \div 6.8$

8. $15.31 \div 4.9$

9. $19973 \div 5.3$

10. $15.2 \div 5.3$

FRACTIONS
Add and subtract the following fractions.

1. $\frac{1}{7} + \frac{3}{7}$ _____

2. $\frac{4}{11} - \frac{2}{11}$ _____

3. $\frac{2}{3} + \frac{4}{5}$ _____

4. $\frac{5}{7} - \frac{2}{6}$ _____

5. $\frac{3}{5} - \frac{1}{3}$ _____

6. $\frac{15}{6} - 1$ _____

7. $2\frac{1}{4} + \frac{1}{3}$ _____

8. $1\frac{3}{4} + 1\frac{1}{5}$ _____

9. $\frac{1}{2} - \frac{2}{5}$ _____

10. $\frac{2}{5} + \frac{1}{7}$ _____

NUMERACY STRATEGIES
Division by multiplication. Solve these by rewriting as multiplication.

e.g. $45 \div 9 \longrightarrow 9 \times \boxed{5} = 45$

1. $32 \div 8$

_____

2. $63 \div 7$

_____

3. $120 \div 12$

_____

4. $84 \div 4$

_____

5. $96 \div 8$

_____

6. $112 \div 4$

_____

7. $144 \div 4$

_____

8. $92 \div 4$

_____

9. $315 \div 5$

_____

10. $159 \div 3$

_____

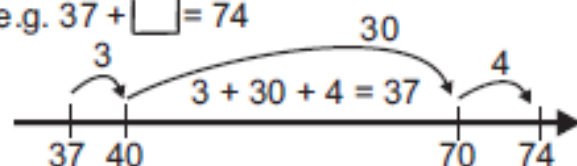| 2.00	0.25	1.50
	2.25	

PUZZLE - MAGIC SQUARE
A magic square has all columns, rows and diagonals that sum to the same number.

Find the missing numbers to make a magic square.

NUMERACY STRATEGIES
Addition by use of a number line.

e.g. $37 + \boxed{} = 74$

$3 + 30 + 4 = 37$

1. $17 + \boxed{} = 52$

2. $25 + \boxed{} = 81$

3. $37 + \boxed{} = 93$

4. $42 + \boxed{} = 111$

5. $53 + \boxed{} = 131$

6. $42 + \boxed{} = 181$

7. $121 + \boxed{} = 163$

8. $117 + \boxed{} = 141$

9. $121 + \boxed{} = 176$

10. $119 + \boxed{} = 157$

QUICK QUESTIONS
Use any strategy but do not use a calculator.

1. $179 + 93 = $ _____

2. $179 - 93 = $ _____

3. $312 \times 7 = $ _____

4. Convert 0.17 to a percentage.

    _____

5. What is 10% of 80?

    _____

6. $-2 + 5 = $ _____

7. $-2 \times 5 = $ _____

8. $1\frac{1}{4} + 2\frac{1}{2} = $ _____

9. $\frac{3}{7} + \frac{4}{10} = $ _____

10. $31.5 \times 10 = $ _____

TESTING TIMES
Two companies offer Brad a job. Both offer $40,000 starting salary. For the first two years, Company 1 will give him a pay rise of $6000 at the end of each year. For the first two years, Company 2 will give him a rise of $1500 every six months. Which deal is the best?

NUMBER SKILLS
Work out the answers.

1. $40 \times 50 =$ _____

2. $0.8 \times 0.9 =$ _____

3. $30 \times 0.7 =$ _____

4. $0.6 \times 4 =$ _____

5. $4.2 \div 0.7 =$ _____

6. Divide 1720 by 8 _____

7. Divide 1720 by 0.8 _____

8. What is the square root of 0.25? _____

9. Simplify $0.1 \times 0.2 \times 0.2$ _____

10. Write $\frac{5}{8}$ as a decimal. _____

11. $123 + \boxed{} = 978$

12. $\boxed{} \times 26 = 442$

13. $\boxed{} - 184 = 2965$

14. $\boxed{} \div 35 = 1999$

15. $50 \times 50 + \boxed{} = 2550$

CROSS NUMBER

Across
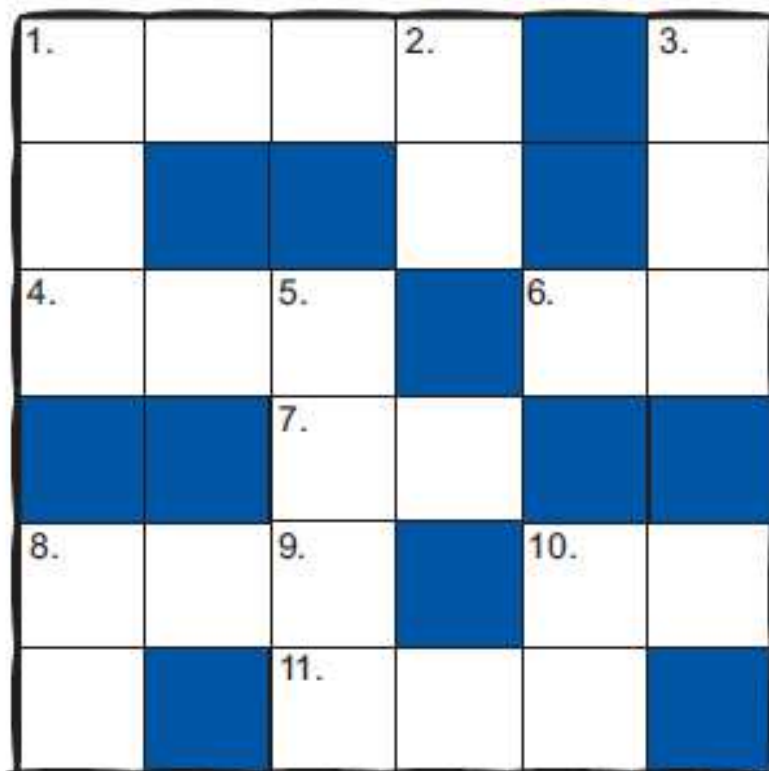
1. $\frac{2}{5}$ of 3845
4. 118×2.5
6. $\frac{3}{7}$ of 210
7. $4\frac{1}{2} \times 3\frac{1}{3}$
8. $\frac{3}{4}$ of 284
10. Write $\frac{21}{30}$ as a %
11. $\frac{4}{7}$ of 301

Down

1. 80% of 240
2. Convert $\frac{4}{5}$ to a percent
3. $2310 \div 3$
5. Convert 5.131×10^3 to ordinary form
8. Increase 15 by 40%
9. $\frac{1}{3}$ of 93
10. Reduce 80 by 10%

Year 10 - Worksheet 3

APPLICATION

John pays one third of his salary to his parents for board. Mary gives three eighths of her salary for board. Who pays the most board if John earns $1230 a week and Mary earns $1120 a week?

_____

_____

FRACTION PROBLEMS

1. $\frac{1}{2} \times 5$ = _____

2. $\frac{2}{3} \times 6$ = _____

3. $\frac{1}{3} \times \frac{1}{4}$ = _____

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

5. $21 \times \frac{1}{3}$ = _____

6. $\frac{2}{3} \times \frac{4}{5}$ = _____

7. $\frac{1}{5} \times \frac{2}{7}$ = _____

8. $1\frac{1}{2} \times 3\frac{1}{4}$ = _____

9. $1\frac{1}{5} \times 1\frac{1}{5}$ = _____

10. $\frac{3}{7} \times \frac{7}{3}$ = _____

11. $8 \div \frac{1}{2}$ = _____

12. $8 \div \frac{1}{4}$ = _____

13. $8 \div \frac{1}{1000}$ = _____

14. $8 \div 0$ = _____

15. $\frac{1}{2} \div \frac{1}{4}$ = _____

16. $\frac{2}{3} \div \frac{4}{5}$ = _____

17. $\frac{7}{11} \div 2$ = _____

18. $1\frac{1}{4} \div 2\frac{1}{2}$ = _____

19. $2\frac{3}{5} \div 1\frac{1}{4}$ = _____

20. $6\frac{1}{3} \div 3\frac{1}{6}$ = _____

PUZZLE

Chloe left a large sum of money in her will to her family. Jim received one half of the total sum, Joan received one third of what was left and Mary received one quarter of what was left after that. There was then $5 000 left over which was split amongst the remaining family members. What was the original sum of money left in Chloe's will?

NUMERACY STRATEGIES (SUBTRACTION)

Subtraction sums can be rewritten as addition: e.g.   73 - 29
                        This can be rewritten to: 29 + 44 = 73

Rewrite these as addition sums.

1.   47 - 9

2.   38 - 15

3.   73 - 25

4.   93 - 47

5.   88 - 59

6.   111 - 93

7.   125 - 89

8.   136 - 73

9.   152 - 118

10.   167 - 139

NUMERACY STRATEGIES (MULTIPLICATION)

To make it easier multiplying you can halve one number and double the other.

e.g. 6×22 $\longrightarrow$ $3 \times 44 = 132$

or $12 \times 11 = 132$

You could also treble one number and find one third of the other

e.g. 1.5×6 $\longrightarrow$ $4.5 \times 2 = 9$

or $0.5 \times 18 = 9$

Use a strategy to calculate these products. Show your working

1. 3×16

2. 28×2

3. 4.6×4

4. 1.6×4

5. 1.3×4

6. 2.7×2

7. 1.2×3

8. 2.4×3

9. 0.9×2

10. 1.5×4

TEN QUICK QUESTIONS

Use any strategy but not a calculator.

1. $223 + 89 =$ _____

2. $221 - 195 =$ _____

3. List the first 6 multiples of 3.

   _____

4. What are the factors of 32?

   _____

5. $-2 - (-3) =$ _____

6. $-312 + (-123) =$ _____

7. $-3 + -2 \times -4 =$ _____

8. $(-3)^2 =$ _____

9. $2.31 \times 100 =$ _____

10. $7.2 \times 0.7 =$ _____

NUMBER SKILLS

Find the values of:

1. $2^4 =$ _____

2. $8^3 =$ _____

3. $10^5 =$ _____

4. $2^3 \times 3^2 =$ _____

5. $2^2 \times 5 =$ _____

6. $\sqrt{121} =$ _____

7. $\sqrt{64} =$ _____

Write in index form:

8. $3^2 \times 3 =$ _____

9. $2^{10} \div 2^5 =$ _____

10. $(2^3)^2 =$ _____

PERCENTAGES

1. Express 36% as a fraction.	6. Express $5\frac{1}{2}$ % as a fraction.
2. Express 22.5% as a decimal.	7. Express $12\frac{1}{4}$ % as a decimal.
3. Find 48% of 3 metres	8. Write $\frac{5}{8}$ as a percentage.
4. Increase $20 by 15%	9. Increase 300 by 5%
5. Decrease $80 by 45%	10. Decrease $120 by 12.5%

Comparing and Ordering Integers

Negative integers | Positive integers

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

Less than   Greater than

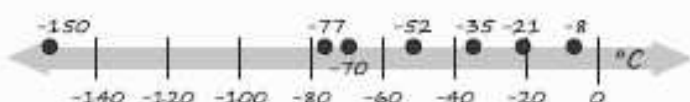Zero is neither negative nor positive
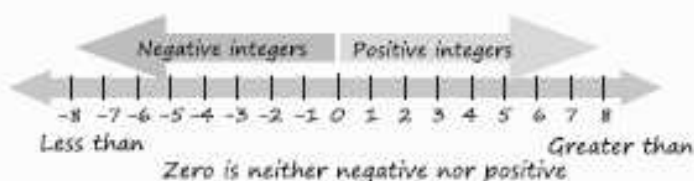
Examples

Water freezes at 0°C but some insects can still survive by expelling excess water and producing a chemical that lowers the temperature at which the water in their body freezes. This lowered temperature is called "supercooling".

Insect	Supercooling point
Arctic Beetle	-52°C
Gall Beetle	-35°C
Goldenrod Gallfly	-8°C
Red Flat Bark Beetle	-150°C
Snow Flea	-21°C
Woolly Bear Caterpillar	-70°C
Upis Beetle	-77°C

The number line below shows these temperatures ordered from least to greatest.

-150   -77 -52 -35 -21 -8
              -70   °C
-140 -120 -100 -80 -60 -40 -20 0

Less Than (<) or Greater Than (>)

-7 > -12   -5 < 0

-12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0

-2 < 2

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

3 > -5

-5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

Exercises

For each of the following, draw a number line and graph the integers given from least to greatest.

1.   -9, 4, -3, 1, 0, 8
2.   -11, 5, -7, 0, -2
3.   15, -7, -4, 8, -5
4.   30, 50, -10, -5, 40
5.   -25, -30, -15, 10

The table below shows the daily high temperatures at Antartica's Scott Base during one week in March.

Day	Temperature
Sun	-16°C
Mon	-17°C
Tue	-9°C
Wed	-13°C
Thu	-18°C
Fri	-25°C
Sat	-21°C

6.   Did the temperature increase or decrease from Sunday to Monday?
7.   Did the temperature increase or decrease from Friday to Saturday?
8.   Which was the coldest day?
9.   Which was the hottest day?
10. What was the mean temperature for the week?

Copy and complete the statements below using a > or < sign
11.   -7 ___ 5
12.   -9 ___ -15
13.   0 ___ 5
14.   5 ___ -15
15.   -20 ___ 15

16.   The lowest temperature recorded on Earth was -89°C in Antarctica in 1983. Which insect in the "supercooling" example was probably tested in a laboratory?
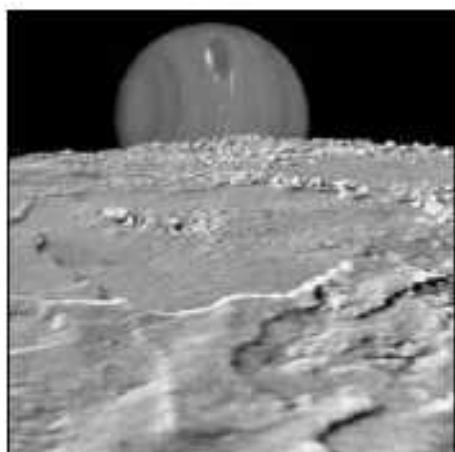

Woolly bear caterpillar

Red flat bark beetle

17. In 1989, data collected by the Voyager spacecraft showed the surface temperature of Triton, Neptune's largest moon, to be -236˚C. Recent data from the Hubble telescope showed the temperature to be -234˚C. Did the Hubble data indicate a temperature less than or greater than the one based on the Voyager data?

Neptune shown on Triton's horizon.

18. A scuba diver studying marine life is 2 metres below sea level. From that depth, the diver descends another 15 metres to the ocean floor. After 15 minutes studying the area he rises 8 metres and rests to avoid decompression illness. Where is the diver relative to sea level?

19. Your bank account statement shows an overdraft of $25. You deposit $100, then spend two amounts at the mall: one for $12 and one for $55. What is your new balance?

20. The lowest temperature ever recorded on Earth was measured at -89˚C, and was recorded at Lake Vostok in Antartica. The lowest temperature ever recorded in New Zealand was in Ophir, Central Otago and was about 62˚C higher. What was the record low temperature in New Zealand?

The 1939 eruption of Kick 'Em Jenny probably looked similar to this eruption of the Kavachi Submarine Volcano in the Solomon Islands. (Photo by Pamela Brodi, 2000)

21. Kick-'em-Jenny is an underwater volcano in the Caribbean Sea. Each year, eruptions cause the volcano to grow. In 1962, the summit elevation of Kick-'em-Jenny was measured at -235 meters. In 2008, the summit elevation was measured at -171 meters. By how many meters did the elevation of the volcano change?

22. There are four stages in the production of ice cream. First, the mix is raised to a temperature of 80˚C to destroy any bacteria. This is called pasteurisation. Next, the temperature is lowered to -5˚C for the mix to age. Flavours are then added and the temperature is lowered to -40˚C to harden the ice cream. Finally, the ice cream is moved to a freezer with a temperature of -15˚C. Using this information, calculate the change in temperature between the four consecutive stages.

Temperature Stages in the Production of Ice-cream

23. Ethylene glycol is a chemical that, added to water, lowers its freezing point. Solution 1, is one part ethylene glycol and three parts water. The freezing point is -11˚C. The freezing point of solution 2, which is two parts ethylene glycol and two parts water, is -35˚C. Which solution has the lower freezing point and by how much lower is it?

24. Surtsey is a volcanic island off the coast of Iceland. It was initially formed by a volcanic eruption in 1963 at 130m below sea level. By 1967 it had reached a maximum elevation of 174m. Since that time it has been reducing in size due to wind and wave erosion. What was the change in elevation from 1963 to 1967.

Surtsey Island

25. Food scientists have tested the effects of freezing cheese and tomato puree filling in lasagne. The filling was frozen to a temperature of -21°C and then raised by 235°C. What was the final temperature of the filling?
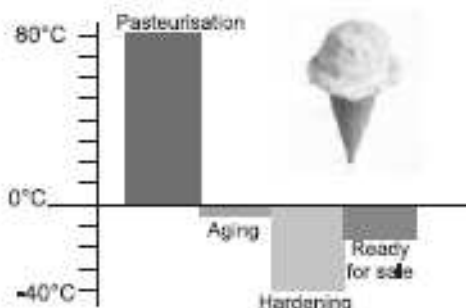

Lasagne - better eaten hot than cold.

4

INTEGERS, isbn 9781877489112

Exercises

Adding and Subtracting Integers

Add the following integers.
1. $-7 + 8$
2. $-5 + 3$
3. $-2 + 9$
4. $-10 + 7$
5. $-13 + 19$
6. $-8 + 17$
7. $-3 + 3$
8. $-14 + 27$
9. $-12 + 4$
10. $-9 + 19$
11. $-6 + 17$
12. $-11 + 6$
13. $8 + 7$
14. $0 + 12$
15. $-1 + 15$

Subtract the following integers.
16. $12 - 18$
17. $9 - 9$
18. $-2 - 8$
19. $-6 - 9$
20. $14 - 27$
21. $8 - 15$
22. $0 - 5$
23. $-1 - 10$
24. $6 - 8$
25. $3 - 11$
26. $13 - 7$
27. $9 - 12$
28. $-2 - 4$
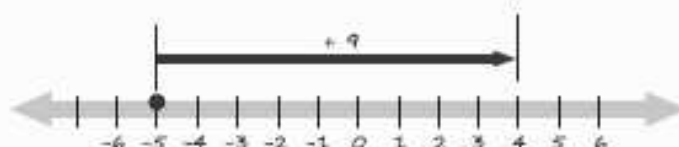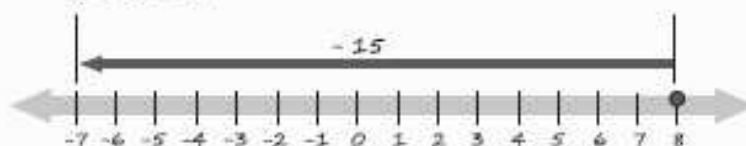29. $-10 - 4$
30. $10 - 21$

You can use a number line to add or subtract integers.

For example:

$-5 + 9 = 4$

$8 - 15 = -7$

31. How can you tell whether the sum of -85 and 52 will be positive or negative?

Write these sentences as sums and calculate the answers.
32. The temperature was 12°C during the day but fell 19°C that night.

33. The car was parked 5 floors underground. Jones traveled in the lift from this floor to the 8th floor of the building.

34. Mr Greene had $5000 in the bank. He spent $5400 on a car. How much does he now have in his bank account?

35. One of the most extreme temperature changes in history occurred in Alberta Canada when in one hour, the temperature rose from -19°C to 22°C. What was the change in temperature?

36. The hottest temperature recorded in the world was in Libya in 1922, when air temperature in the Sahara desert reached 58°C. The ground temperature was measured at 66°C. What was the difference between the air temperature and the ground temperature?

37. In 1960, the US Navy sent the submersible mini-submarine Trieste down into the depths of the Marianas Trench (the deepest part of the ocean). It touched the bottom at 10,923m. Mount Everest (the tallest mountain) is measured at 8850 m. If Mount Everest was moved to the bottom of the Marianas Trench how far below sea level would its peak be?
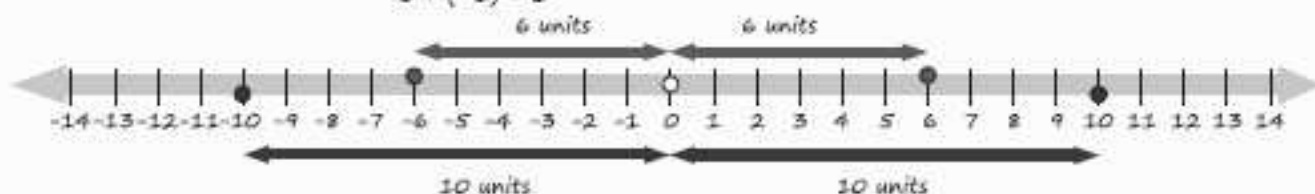

The USS Trieste (1958)

Integer Opposites

Two numbers are opposites if they are the same distance from 0 on the number line.
When you add opposites the sum is 0.

For example:

The opposite of 6 is -6

$6 + (-6) = 0$

The opposite of -10 is 10

$-10 + 10 = 0$

Exercises

When you add integer opposites the result is always zero. Add the following integer opposites.

1. (-6) + 6
2. 10 + (-10)
3. (-8) + 8
4. 2 + (-2)
5. 6 + (-6)
6. (-10) + 10
7. 8 + (-8)
8. (-2) + 2

Integer opposites sum to equal zero.
Therefore if you have the same number of
1s as -1s then you have zero.

 = 0

Use the opposite rule to calculate the following:

9.   -7 + 10 + 7
10. -5 + 8 + 5
11. 3 + (-3) + 9
12. 15 + 7 + (-7)

Examples

Which number value does each diagram represent?

 = -3

 = 1

Which number do these diagrams represent?

13.
14.
15.
16.
17.
18.
19.
20.

Adding and Subtracting Negative Integers

Exercises

Use the diagrams to help add the following integers.

1. $3 + (-10)$
2. $10 + (-6)$
3. $9 + (-7)$
4. $4 + (-10)$
5. $10 + (-5)$
6. $5 + (-4)$
7. $-8 + 0$
8. $-2 + 10$
9. $-7 + 10$
10. $-9 + 5$
11. $-7 + 2$
12. $-10 + 1$

$7 + (-9) = -2$

$3 + (-8) = -5$

$-2 + 8 = 6$

$-7 + 10 = 3$

Integer opposites sum to equal zero. Therefore if you have the same number of 1s as -1s then you have zero.

Use the diagrams to help subtract the following integers.

13. $1 - (-1)$
14. $8 - (-1)$
15. $4 - (-4)$
16. $3 - (-2)$
17. $7 - (-1)$
18. $2 - (-8)$
19. $0 - (-3)$
20. $-6 - (-2)$
21. $-9 - (-9)$
22. $-5 - (-8)$
23. $-10 - (-7)$
24. $-7 - (-3)$

$5 - (-2) = 7$

$4 - (-6) = 10$

$-3 - (-2) = -1$

$-8 - (-10) = 2$

$-9 - (-13) = 4$

Subtracting a negative integer is the same as adding the integer opposite.

$$-9 - (-13) = -9 + 13$$
$$= 4$$

Integer Arithmetic

Exercises

Calculate
1. $-3 + (-5)$
2. $-9 + (-2)$
3. $8 + (-2)$
4. $-5 + (-8)$
5. $-3 + 5$
6. $-9 + 4$
7. $-4 + 9$
8. $10 + (-8)$
9. $6 + (-13)$
10. $13 + (-9)$
11. $-5 + (-7)$
12. $-13 + 5$
13. $13 + (-4)$
14. $-8 + (-9)$
15. $-5 + (-6)$
16. $-14 + 8$
17. $-1 + 10$
18. $9 + (-3)$
19. $10 + (-20)$
20. $-2 + 15$
21. $-12 + 30$
22. $-5 + -6$
23. $0 + (-8)$
24. $-12 + (-3)$
25. $-4 - 10$
26. $5 - 9$
27. $-1 - 6$
28. $-8 - 8$
29. $-6 - (-5)$
30. $12 - (-3)$
31. $5 - (-8)$
32. $-8 - (-3)$
33. $-6 - (-7)$
34. $9 - (-5)$
35. $-6 - (-4)$
36. $-7 - (-7)$
37. $-11 - 6$
38. $-15 - (-8)$
39. $-3 - 15$
40. $0 - (-9)$
41. $-14 - (-4)$
42. $-3 - (-9)$
43. $-9 - (-6)$
44. $1 - (-10)$

If $m = -5$, evaluate:
45. $15 - m$
46. $m - 12$
47. $-7 - m$
48. $20 + m$
49. $8 + (-m)$
50. $-9 + (m)$

$-6 + 13 = 7$

$-1 + (-6) = -7$

$-5 - (-9) = -5 + 9$
$= 4$
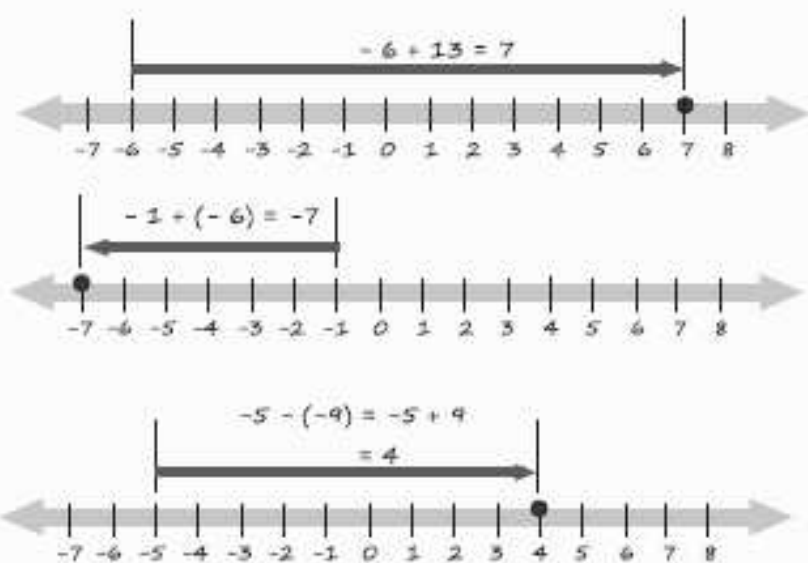
A number line can still be used for integer arithmetic.
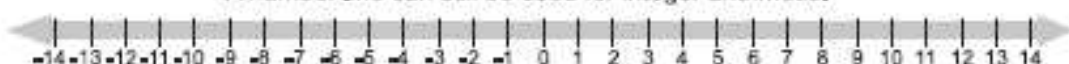
Two statue depictions, one of Julius Caesar and the other a young Cleopatra.

51. Julius Caesar was born in 100 BC and died in 44 BC. His mistress Cleopatra was born in 69 BC and died in 30 BC.
    a. How old was Caesar when he died?
    b. How old was Cleopatra when she died?
    c. What was the age difference between Caesar and Cleopatra?

52. A cliff top overlooking the ocean is 123 m above sea level. The sea floor at the foot of the cliff is 15 m below sea level. A stone is dropped from the top of the cliff and falls to the sea floor. Write an expression that best represents the distance the rock has fallen.

More Integer Arithmetic

Exercises

1. At takeoff (T) minus 31 seconds the onboard computers of the space shuttle Atlantis take over the launch sequence from the ground network. At T minus 7 seconds, the shuttle's main engines ignite. At T minus 0 seconds, the solid rocket boosters ignite and we have liftoff for Atlantis.

   At T plus 156 seconds the solid rocket boosters are exhausted of fuel and they detach from the orbiter and fuel tank. At T plus 9 min, the external tank separates from the orbiter and at T plus 10 min 30 seconds the orbital maneuvering system engines fire to place the Atlantis in a low orbit. Finally, at T plus 45 min, the orbital maneuvering system engines fire again to place the shuttle in a higher, circular orbit (about 250 miles/400 km). The space shuttle is now in outer space.

   What is the time difference between when the onboard computers take over the launch sequence and when the solid rocket boosters detach from Atlantis?

Liftoff for Atlantis

2. According to the Guinness Book of World Records, Verkhoyansk, the river port in North Eastern Siberia, has the most extreme climate on the planet. The average winter temperature is -50°C while the average summer temperature is 14°C. What is the difference between the coldest and hottest average temperatures.

The Verkhoyansky range.

3. The tallest mountain in the world (when measured from base to peak) is Mauna Kea (white mountain) in Hawaii. Its base is 6000 metres below sea level and it rises 10207 metres. What is the height of the peak above sea level?

4. Business profits are expressed as a positive number and are usually referred to as operating in the black. A business loss is a negative number and is usually referred to as operating in the red. Look at the 6 month profit - loss graph below and find the sum of the profits and losses.

The White Mountain – named because of seasonal snow.

Monthly Profits and Loss Graph

$10 500 — Jan
$5 400 — Feb
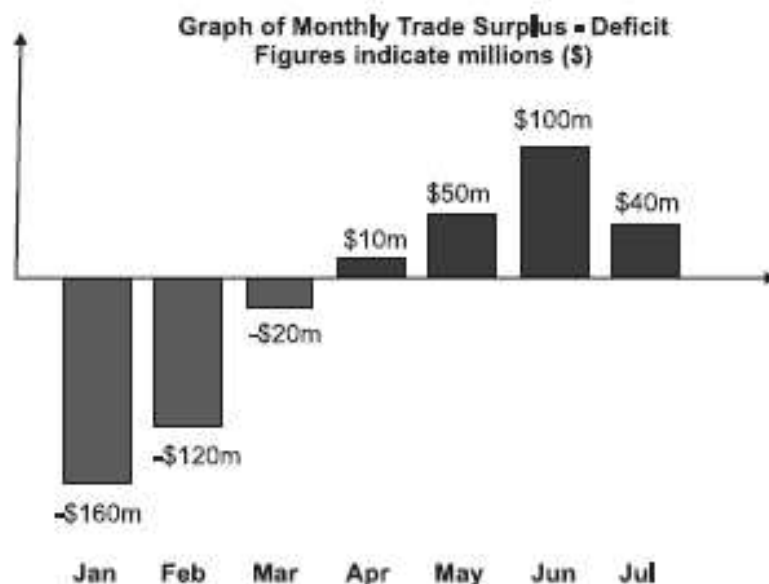-$6 100 — Mar
-$12 800 — Apr
$4 200 — May
$2 500 — Jun

5. A company's accounts sheet is shown in the table on the right. It shows the profit and loss results for an 8 month period.

What was the overall profit or loss?

Month	Profit	Loss
Aug	$30 000	
Sept		-$50 000
Oct		-$10 000
Nov	$20 000	
Dec	$15 000	
Jan		-$20 000
Feb	$10 000	
Mar	$15 000	

6. A country's exports and imports are usually collated each month by the government statistics department. If more money is received from exports than spent on imports then the country is running a trade surplus. If more money is spent on imports than received from exports then the country is running a trade deficit. A graph showing 7 months of trade surpluses and deficits for New Zealand could look similar to that below:

Graph of Monthly Trade Surplus - Deficit
Figures indicate millions ($)

Jan   Feb   Mar   Apr   May   Jun   Jul

a. What is the change in trade figures between February and March?
b. What is the change in trade figures between March and May?
c. Calculate the total surplus or deficit for the 7 month period.

7. Lake Taupo in the middle of the North Island, New Zealand, is constantly having its level monitored. The level rises and falls due to rainfall, winter snow melt and extended dry periods. Over a 4 month period the levels were recorded as: April rise of 2 metres, May rise of 1 metre, June fall of 5 metres, July rise of 3 metres. How much has the level changed over the 4 month period?

Lake Taupo with the volcanoes of Tongariro National Park beyond

8. A student who has $180 in her account receives a $750 tax refund. She then pays university course fees of $550. How much does she now have in her account?

9. Claudia has a -$467 balance on her credit card. She returns a sweater worth $129 to the store. How much does she now owe on her credit card?

10. At the beginning of August, Sabine's credit card account shows a debt of $470. She makes a payment of $45 but then makes further purchases of $160. At the end of August she makes a further payment of $500. What is the balance of her account at the beginning of September?

11. The surface temperature on Mars has been measured as -128°C on a polar night and 27°C at midday when it has been at its closest orbit point to the sun. Find the range of the temperatures i.e. The difference between the high and low temperatures.
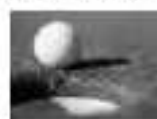
12. When playing golf the following terms apply:

Par - the number of shots that it should take to hole the golf ball.
Birdie   1 shot below par
Eagle   2 shots below par
Bogie   1 shot above par
Double Bogie   2 shots above par

The surface of Mars

The Ngunguru Golf Course is a nine hole golf course. Ngunguru is "a place in the sun" just 20 minutes from Whangarei next to the spectacular Tutukaka coastline. Par for the course is 29 shots. In one particular game a player scored the following:
One hole on par, two birdies, one eagle, four bogies and one double bogie. How many points above or below par was the player and what was their final score?

13. The stock market in New Zealand is run by the NZSX. Company stocks are bought and sold and their price fluctuates each day. At the end of each day, week and month the average price across all stocks is reported and the average price will be either up or down from the previous period. Over a 6 week period a class took note of the NZSX trading. The results are listed below:

The Pacific Rendezvous motel complex, next door to the Ngunguru Golf Course.

Week 1: Down 13 points
Week 2: Down 16 points
Week 3: Up 36 points
Week 4: Down 11 points
Week 5: Up 19 points
Week 6: Up 20 points

By how many points has the stock market fallen or risen over the whole 6 week period?

14. If you added up all the integers from -50 to 50 what would be the sum?

Outside the New Zealand Stock Exchange.

Calculate:

15.	2 + (-7)	**27.**	-24 + (-9)	**39.**	18 + (-21)
16.	-5 + 2	**28.**	19 + (-15)	**40.**	23 - 38
17.	-11 + 5	**29.**	-27 + 18	**41.**	-21 + 25
18.	4 + (-2)	**30.**	53 - (-18)	**42.**	-50 - (-9)
19.	-6 + 7	**31.**	-15 - (-45)	**43.**	23 - (-23)
20.	8 - (-8)	**32.**	-23 - (-16)	**44.**	-32 - 10
21.	3 - (-5)	**33.**	-33 - 44	**45.**	25 + (-31)
22.	-4 - (-6)	**34.**	-20 - (-20)	**46.**	-19 - 8
23.	-7 - 0	**35.**	-26 + 15	**47.**	29 - (-16)
24.	-13 - 2	**36.**	-31 + (-12)	**48.**	-15 - 21
25.	0 + (-27)	**37.**	13 + (-9)	**49.**	34 + (-12)
26.	-17 + (-25)	**38.**	27 + (-4)	**50.**	-13 - (-27)

Multiplying and Dividing Integers

Example

An investor owns shares of stock in an electronics company, an energy company and a construction company. Over one year the values of the shares change as shown in the table below.

Calculate the total change in value:

Stock Portfolio

Stock	number of shares	change in value of one share	total value change
Electronics	500	decreased $2	$1 000 loss
Energy	300	increase $4	$1 200 gain
Construction	200	decrease $3	$ 600 loss

Total Change in value = (-$400) i.e. $ 400 loss

The bronze statue of the Merrill Lynch Bull in New York's financial district is usually identified as symbol of Wall Street, home of the New York Stock Market.

Exercises

1. Scientists were asked to test an electronic GPS device that would be used in Antartica. They placed the device in a test chamber set at a temperature of 20°C. Each minute they lowered the temperature in the chamber by 3°C.

   Write an integer that represents the change in the temperature in the test chamber in 1 minute.

   Write a product that represents the total change in temperature after 7 minutes.

   Calculate the temperature in the chamber after 10 minutes.

A typical marine GPS device.

2. During a chemical reaction the temperature in a test tube decreased by 2°C every minute until 9:23am. If the temperature was 15°C at 8:55am what was the temperature at 9:23am?

3. The colour of fireworks are determined by the heat being generated. At 480°C the colour is faint red, at 580°C the colour is dark red, at 730°C bright red, at 930°C bright orange, at 1100°C pale yellow, 1300°C yellowish white and 1400°C white. If a set of fireworks is ignited and their temperature increases by 280°C every second, how long will it take before the fireworks are the colour white?

Fireworks across the Sydney Harbour Bridge. Fireworks are the result of a chemical reaction

4. As altitude increases, the air pressure decreases. This means that the boiling point of water also decreases. At sea level, water boils at 100°C. As a rough guide, the boiling temperature decreases by 1°C as altitude increases by 300 metres.

. Mt Taranaki is found in New Zealand's North Island. It has a peak of 2518 metres. If climbers stopped at 2100 metres and boiled some water for a coffee break what would be the temperature of the boiling water?

. Mt Cook is New Zealand's highest mountain with a peak at 3755 metres above sea level. If climbers were boiling water at a height of 3600 metres what would the boiling temperature of the water?

5. McMurdo Station, in Antarctica, is located on the southern tip of Ross Island on the shore of McMurdo Sound in New Zealand territory, 3,500 km due south of New Zealand. The station is the largest community in Antarctica and can support up to 1,258 residents. The table below shows average temperatures at McMurdo Station from April to September. Find the mean of the temperatures.

Month	Apr	May	Jun	Jul	Aug	Sep
Av Temp °C	-19	-21	-19	-22	-24	-21

Mt Taranaki, New Zealand

Smoothing snow at McMurdo Sound to prepare for aircraft landings.

When Multiplying Two Integers

SAME Signs – product is POSITIVE

e.g. $-4 \times -14 = 56$ $5 \times 15 = 60$

DIFFERENT signs – product is NEGATIVE

e.g. $7 \times -8 = 48$ $-20 \times 4 = -80$

The product of any integer and 0 is 0

e.g. $-13 \times 0 = 0$ $0 \times 28 = 0$

When Dividing Two Integers

The quotient of two integers with the same signs is POSITIVE

e.g. $16 \div 8 = 2$ $-27 \div -9 = 3$

The quotient of two integers with different signs is NEGATIVE

e.g. $-24 \div 6 = -4$ $30 \div -10 = 3$

Calculate:

6. 8×-11
7. -6×-8
8. -5×-7
9. 0×-20
10. 20×-6
11. -9×-4
12. -4×7
13. -15×3
14. 4×-18
15. 25×-5

16. $-24 \div 8$
17. $0 \div -20$
18. $-36 \div -6$
19. $28 \div -7$
20. $40 \div -4$
21. $-39 \div -13$
22. $96 \div -3$
23. $-42 \div -7$
24. $-98 \div 2$
25. $-64 \div 16$

26. -15×-4
27. $24 \div -6$
28. -18×3
29. $-54 \div -2$
30. 20×-7
31. $-200 \div -5$
32. -90×-9
33. $-76 \div 4$
34. $-6 \times -5 \div -3$
35. $-8 \div 2 \times -3$

⊕⊕⊕⊕⊕⊕⊕
⊕⊕⊕⊕⊕⊕⊕
⊕⊕⊕⊕⊕⊕⊕
⊕⊕⊕⊕⊕⊕⊕

$4 \times (-7) = -28$

$-28 \div 4 = -7$

each row has a value of -7

$-28 \div -7 = 4$

there are 4 rows of -7

⊕⊕⊕⊕⊕⊕
⊕⊕⊕⊕⊕⊕
⊕⊕⊕⊕⊕⊕
⊕⊕⊕⊕⊕⊕
⊕⊕⊕⊕⊕⊕

$5 \times (-6) = -30$

$-30 \div 5 = -6$

each row has a value of -6

$-30 \div -6 = 5$

there are 5 rows of -6

36. To find the difference between average temperature, and actual temperature you can use the expression $D = H - A$ where H is the historical mean and A is the actual measured mean temperature.

Use the table below to find the difference between the average historical temperatures and the measured temperature means for Auckland during one February.

Find the mean difference between the historical average temperatures and the actual measurements.

Sailing into Auckland City.

Temperatures for Auckland during February

Week	1	2	3	4
Historical Mean	26°	28°	26°	28°
Measured Mean (°C)	24°	25°	27°	24°

37. A MIR submersible is a small type of submarine. It can dive at a rate of 25 metres each minute.

On one particular day a MIR takes 240 minutes to reach the lowest point to which it can safely dive. What is its depth at that point?

How long would the MIR take to dive to -425 metres (425 metres below sea level) if it was diving 25 metres each minute?

A Russian deep-manned Submersible MIR. It provides valuable information for oceanographic researchers.

Calculate:
38. $(-3 \times 5) \times 4$
39. $(8 \times -6) \times -2$
40. $(-6 \times -5) \times -2$
41. $-2 \times (-8 \times -2)$
42. $(-7 \times -2) \times -3$
43. $-3 \times (9 \times 10)$
44. $(4 - 3) \times (5 - -1)$
45. $(-5 - 8) \times (6 - 10)$

When $x = -4$,
$-8x^3 = -8 \times -4 \times -4$
$= -128$

$\dfrac{6x^2}{-8} = \dfrac{6 \times -4 \times -4}{-8}$
$= \dfrac{96}{-8}$
$= -12$

Find the value of each expression when $x = -5$

46. $-10x^3$

47. $\dfrac{75}{x^2}$

48. $-(8x^2)$

49. $\dfrac{4x^2}{-10}$

50. $x^3 + 5x^2$

Unit 23 — THE TERRIBLE FLU EPIDEMIC OF 1918

World War 1 killed about nine million people in the world. The great flu epidemic that raged around the world in 1918 killed about 21 million. The estimated deaths for New Zealand were between six and nine thousand people. The flu was known as the Black Flu because people sometimes turned black after dying. An epidemic is a disease that happens in a place for a short time and affects many people there. Flu is short for influenza.

Christchurch 1918 – trying to keep the flu bugs away.

In October 1918 the SS *Niagara* arived in Auckland with the Prime Minister and Minister of Finance. They had been to a war-time conference in Europe. There were many cases of flu on board. A crew member had died. People later blamed the ship for bringing the flu. But flu cases had been reported earlier.

When war ended in November record crowds took to the streets. They came in contact with the deadly flu.

The Health Department gave sick people small bottles of stout, whisky and brandy. That eased pain for a bit but did not cure the flu. Special spray chambers were set up. They treated up to 30 people at a time. People lined up and got sprayed with a zinc-sulphate solution. It was supposed to kill the bugs but it didn't. Other sprays were tried such as spraying mail with formalin to stop letter-readers getting the flu.

Emergency kitchens were set up. They were for families where nobody was well enough to make meals. Many volunteers worked without thinking of their own safety. A lot of doctors were still overseas because of the war. Private cars were used as ambulances. In Auckland dead bodies were kept in Victoria Park before burial. Special funeral trains took them and mourners to the cemetery.

Towns became ghost towns. Trams stopped running. Many theatres, cinemas, pubs, schools, shops, churches closed. Race meetings were cancelled. Coal supplies from mines ran down. Children looked after sick relatives. One job was to put a white flag on the mail box as a sign that a dead body needed collecting.

Workers were shocked at the awful living conditions of some people. Too many people knew nothing about how to keep clean and how infection spread. The flu led to more health inspectors being appointed. There were also more school nurses to teach children how to stay clean.

1 The following are some things that happened during the flu epidemic. They are CAUSES because they caused a RESULT to happen. For each CAUSE, write one RESULT.

a) The SS *Niagara* had sick people on it. _____

b) War ended in November. _____

c) Workers were shocked at living conditions. _____

d) Many children did not know how to stay clean. _____

e) White flags were put on mail boxes. _____

f) Sick people were given alcohol to drink. _____

g) Spray chambers sprayed people. _____

h) There were not enough ambulances to cope. _____

i) Many doctors were still overseas. _____
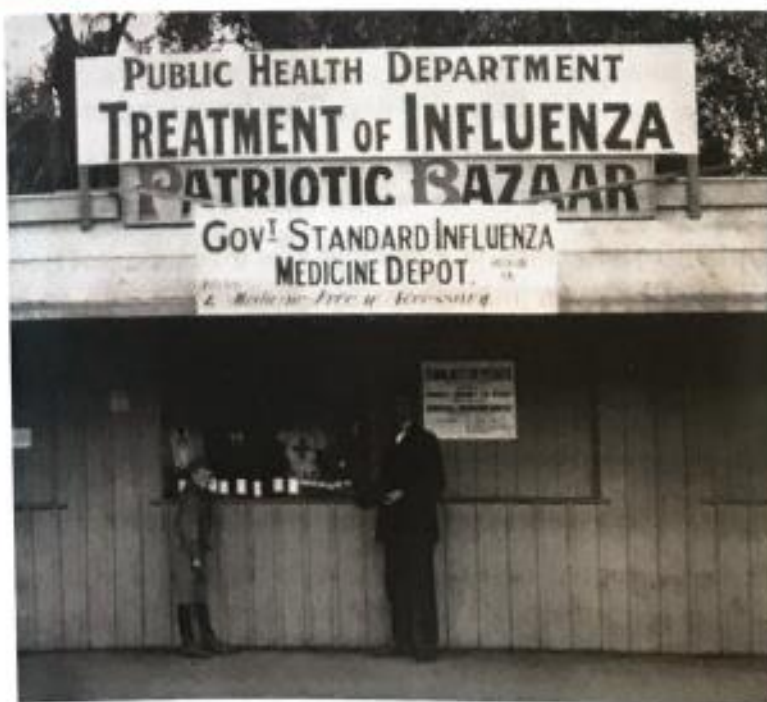
j) People stopped going to town. _____

2 Write the number of each paragraph in the box at the beginning of the paragraph.

3 Finish the following by writing numbers in the gaps.

a) Specific months are mentioned in paragraphs _____ and _____ .

b) The meanings of influenza and epidemic are in paragraph _____ .

c) Efforts to teach people about hygiene are mentioned in paragraph _____ .

d) The effect on entertainment is mentioned in paragraph _____ .

e) Special inhalation chambers are mentioned in paragraph _____ .

4 Check out the picture and write answers to fill the gaps in the following.

a) This picture was taken in Christchurch in the year _____ .

b) The word for which 'flu' is the short version is _____ .

c) The abbreviation for 'Government' is _____ .

d) The 'medicines' are the three alcoholic drinks called _____ , _____ , and _____ .

PUBLIC HEALTH DEPARTMENT
TREATMENT OF INFLUENZA
PATRIOTIC BAZAAR
Gov^t STANDARD INFLUENZA
MEDICINE DEPOT.

HOW MUCH DO YOU KNOW ALREADY?

1 The boxes marked a)-g) on the map refer to the following continents. Write these names in the correct boxes on the map.

Africa   Antarctica   Asia   Australia

Europe   North America   South America

2 Colour these places on the map:

blue = 1 cm square of where the Pacific Ocean is
green = New Zealand
yellow = 1 cm square of where the Tasman Sea is
red = 1 cm square of where the Arctic Ocean is

3 ①-㉜ on the map refer to the following countries. Write the numbers beside them here.

Afghanistan _____   Israel _____

Argentina _____   Jamaica _____

Bolivia _____   Japan _____

Canada _____   Malaysia _____

China _____   Myanmar _____

Colombia _____   Papua New Guinea _____

Egypt _____   Peru _____

France _____   Russia _____

Germany _____   Saudi Arabia _____

Great Britain _____   Sierra Leone _____

Greece _____   Singapore _____

Honduras _____   Solomon Islands _____

India _____   South Africa _____

Indonesia _____   Tonga _____

Iraq _____   USA _____

Italy _____   Zimbabwe _____

4 Ⓐ-Ⓖ on the map refer to the following places. Write the letters beside the correct places here.

Balkans _____   Bermuda Triangle _____   Indochina _____   Middle East _____

Monsoon Asia _____   Oceania _____   Sunshine Coast _____

c)

g)

d)

f)

e)
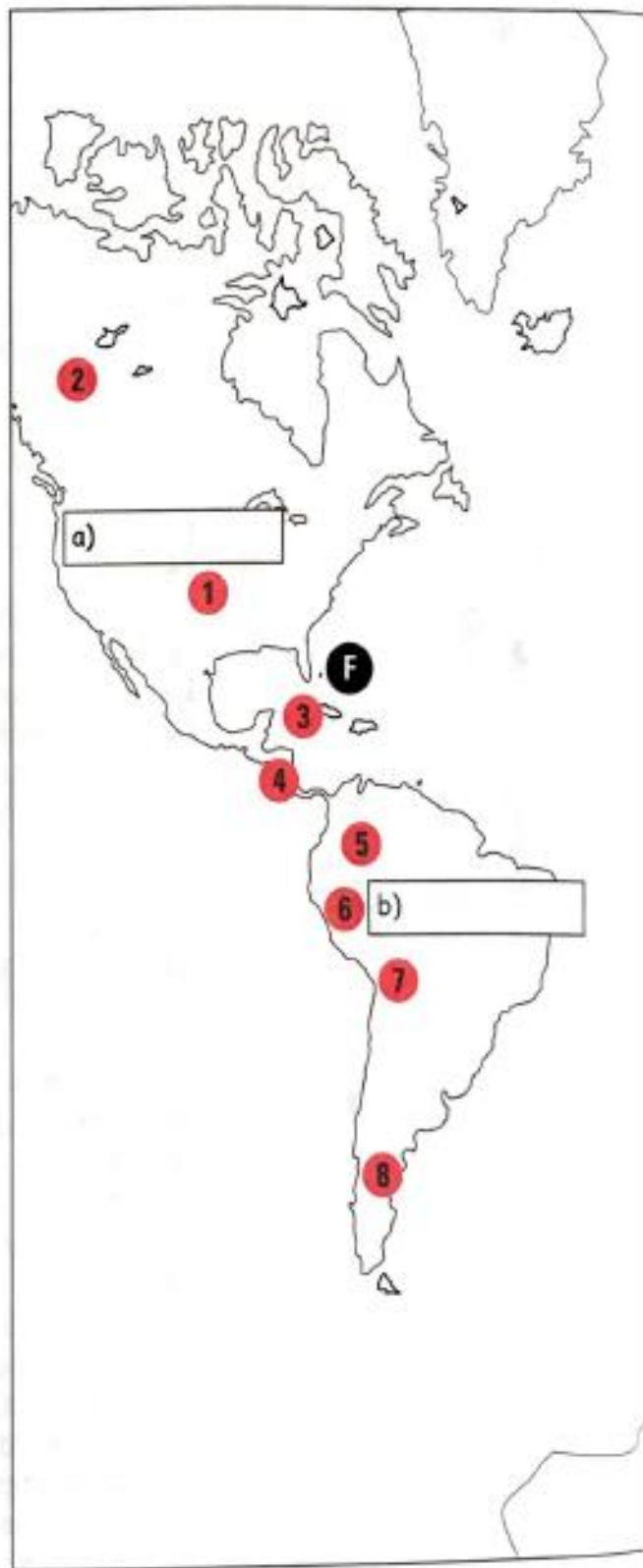
5 Use the clues in brackets to help you write the following words in the right (approximate) places on the map.

a) BUSHFIRES (every year in country near NZ)   b) US INVASION (in 2003 to topple Saddam Hussein)

c) AIDS EPIDEMIC (in poorest continent in world)   d) SEPTEMBER 2001 (terrorist attacks on New York)

e) KYOTO (place hosted agreement on global warming)   f) EQUATOR (where the imaginary line runs above NZ)

g) COLUMBIA (space shuttle disaster of 2003)   h) KREMLIN (where Moscow's government is)

i) PALESTINIANS (suicide bombers in Israel)   j) OLYMPICS (where the Olympics began)

k) DEMOCRACY (this country is largest democracy in world)