Section 1: Doing The Numbers

1C Solving problems 7 //applied

1D Calculations 9
1 a. 4.5 or 9/4 b. 31
c. 62.5 d. 833
e. 3329.5 f. 10
g. $12.50 h. $95.13
i. 3 j. 1.0625
k. $360 l. $312
m. $1.80 per litre n. 14 litres per 100 km
o. 83.33 km/h p. x = 5
q. 8000 cm³ r. Smaller

2. // applied

1E Basic calculations 1 11
1. 4,120.55 2. e.g. 137 , 313.5

Multiplication 1F 13
a. 54 b. 32 c. 120 d. 42
e. 75 f. 96 g. 143 h. 144
i. -525 j. 10 k. 240 l. $50
m. 1080 n. 2000 o. 322 p. 600 mins

1G Division 15
a. 2 b. 3 c. 15 d. 8
e. 15 f. 20 g. 16 h. 12
i. 15 j. 100 k. -2 l. 1.5
m. 14 n. 10 o. 50 p. 2.5
q. 5 r. 20 s. 3 t. 8

1H Fractions & decimals 16

1/4   11/3   5/2   9/10   3/2   2/3   4/3   7/2   27/4   3/5   5/7   5/4   7/10   19/20
0.25   3.67   2.50   0.90   1.50   0.67   1.33   3.5   6.75   0.60   0.71   1.25   0.70   0.95

1I Fractions & decimals 17
a. 1.5 b. 27/49 c. 0.375 d. 0.1875
e. 0.64 f. 125,000,000 g. 71.375 h. 0.64

1J Fractions, decimals & ratios 19
1a. Seven million five hundred thousand dollars
b. Two hundred and fifty thousand dollars
c. One hundred and twenty-five thousand dollars
d. Ten thousand and two hundred and fifty dollars
e. Eight hundred and seventy-five dollars
f. Seven hundred and fifty million dollars

2a. Ratio: 1:10 (1 part out of 10) Percentage: 10%
b. Ratio: 1:4 (1 part out of 4) Percentage: 25%

c. Ratio: 7:20 (7 parts out of 20) Percentage: 35%

d. Ratio: 25:100 (25 parts out of 100) Percentage: 25%

e. Ratio: 2:1 (2 parts out of 1) Percentage: 200% (because it's double)

f. Ratio: 5:6 (5 parts out of 6) Percentage: 16.67% (because it's a reduction of one-sixth)

3. a. **2** hours at 50kmh b. 0.67hr or approx 40 minutes at 90kmh c. 2.5 hours at 4kmh

d. 1 kg/hour e. 44.5 hot dogs/ hour f. 21.6 coffees/hour

g. 3.53 hours at approx 5.97 km/h h. Lost $8.33/minute or $500/hr i. approx $22,222/year

1K Percentages 21

1. // applied visual task

2.

	1%	2.5%	5%	7.5%	10%	20%	25%	33%	40%	50%	60%	66%	75%	80%	100%
100	1.00	2.50	5	7.50	10	20	25	33	40	50	60	66	75	80	100
50	0.50	1.25	2.50	3.75	5	10	12.50	16.50	20	25	30	33	37.50	40	50
1000	10	25	50	75	100	200	250	330	400	500	600	660	750	800	1000
500	5	12.50	25	37.50	50	100	125	165	200	250	300	330	375	400	500
250	2.50	6.25	12.50	18.75	25	50	62.50	82.50	100	125	150	165	187.50	200	250
156	1.56	3.90	7.80	11.70	15.60	31.20	39	51.48	62.40	78	93.60	102.96	117	124.80	156

1L Calculating percentages 23

1a. $375 b. $2,500 c. $30,000

d. $1,050 e. $141 f. $1,500

g. $281.25 h. $65 i. $51,750

 j. $0 k. $200 l. $100 m. $10

2a. 50% increase b. 50% increase c. 42.86% increase

d. 19.05% increase e. 9.09% decrease f. 4.78% decrease

1M Rounding 25

1a. 2 b. 25 c. 127 d. 57 e. -2

2a. 1.3 b. 20.8 c. 19.8 d. 17.6 e. 11.3

f. -0.8 g. 5.5 h. 158.2 i. 750.5 j. -27.3

3a. 1.26 b. 20.83 c. 15.25 d. 11.12 e. 75.59

f. -4.52 g. 9.88 h. 99.43 i. 750.26 j. 1124 .50

4a. $7.95 b. $8.00 c. $11.50 d.$250.60 e. $0.85

f. $23.95 g.$39.95 h. $69.10 i. $1002.35 j. $788.50

1N Powers & roots 27

1. 9, 100, 2500, 6.25, 81, 1024, 81, 36, 4x81 = 324, 4+8 = 12, 9-4 = 5 100,000-100 = 99,900

2. Square root of 4: 2, 400: 20, 4,000: 63.246, 10: 3.162, 100: 10, 1,000: 31.623, 5: 2.236, 500: 22.361, 5,000: 70.711, 4.8: 2.191, 10,000: 100, 1,000,000: 1,000

3. 50mm, 19.21cm, 22.36cm, 118.70 mm

Applied

Door with Area of 2,500 cm² = 50 x 50 cm

Door with Area of 1,600 cm² = 40 x 40 cm

Door with Area of 1,200 cm² = 34.6 x 34.6 cm approx

Right-Angled Triangle with height of 50 cm and width of 35 cm = h 50cm, width = 35cm (area 875cm^2)

Section 2: Shape Up

2A Visual numeracy 35 //applied

2B 2D into 3D 37 //applied physical task

2C Transforming objects 39

1. Dilation (reduction), Rotation 180^0

Rotation 90^0, Dilation (expansion) & rotation 180^0

Reflection, Dilation (reduction) & rotation -90^0

2. //applied design task

2D Combining shapes 40 //applied design task

2E Compound shapes and objects 41 //applied design task

2F Measuring angles

1. 60^0 , 60^0 , 60^0

75^0 , 60^0 , 45^0

45^0, 90^0, 45^0

35^0, 125^0, 20^0

20^0, 140^0, 20^0 (or 18^0 , 144^0 , 18^0)

2. angle 3 = 180^0 less (angle 1 + angle 2)

3. square = 4 x 90 degrees, rectangle = 4 x 90 degrees, rhombus 2 x 135^0 2 x 45^0 , Parallelogram approx. 2x 115^0 2 x 65^0, trapezium 2 x 120^0 2 x 60^0, kite approx. 60^0 90^0 105^0 105^0

2G Angles at play 46 //applied measuring task

2H Driving and angles 47 //applied investigative task

2I Sketching 49 //applied design task

2J House plan 51 //applied measuring task

1. Plan looks close to scale but some of the objects inside seem a little big (single beds, sofa) or a little small (kitchen sink and burners). Also the house block is a little 'tight' for the house.

2K Modelling 53 //applied design task

2L Scaling 55 //applied measuring & design task

2M Mixing scale 56 //applied visual task

2N Technical drawings 57 //applied measuring & design task

Section 3: Measuring Up

3A Units of measurement 63

1. ...for distance is usually metres or km.

2 a. 5 tonnes, b. 1ml, c. 1 tonne, d. 375ml, e. 2.5ML, f. 60 min, g. 800, h. 13,000km, i. 2.02m

3. 3,500g, b. 0.75l, c. 750m, d. 295mm, e. 1,250ml, f. 3.5km, g. 3 1/2 min, h. 150 min, i 37.78^{O}

3B Measuring 64 //applied investigative task

3C Measuring devices 65 //applied investigative task

thermometer: temperature oC;   calliper: distance mm or degrees

altimeter: altitude feet or hPa;   odometer: distance km;

scale: weight grams, kg or tonnes;   ammeter: current A amperes

speedometer: speed km/h;   measuring tape: length or width or height (distance) mm

barometer: atmospheric pressure atmospheres or bars

wind vane: wind direction using directions!;   pedometer: steps or distance metres or kms

sphygmomanometer: blood pressure (systolic and diastolic pressures)

3D Ye olde measures 66 //applied investigative task

Cubit: A length measurement, traditionally based on the length of the forearm from the elbow to the tip of the middle finger; approx 18 inches (457 mm).

Hundredweight: A unit of weight equal to 112 pounds; or 100 pounds US.

Furlong: A unit of distance equal to one-eighth of a mile or 220 yards (201.17 metres).

League: A unit of distance historically varying but often considered to be about three miles (4.83 km).

Peck: A unit of dry volume or capacity, typically equal to 2 gallons (9.09 litres) or 8 dry quarts.

Ell: A measure of length, particularly used for textiles, historically varying in length but often around 45 inches (1.143 metres).

Chain: A unit of length equal to 66 feet (20.12 metres) or 22 yards, used in surveying and land measurement.

3E Perimeter and area 69

i. Circular Rug, Circumference: 1.634 m, Area: 0.212 m²

ii. Roof of a Rectangular Garage, Perimeter: 14.6 m, Area: 12.42 m²

iii. Triangular Sail, Perimeter: Not enough information, Area: 0.525 m²

iv. Room // applied

v. Backyard // applied

vi. 4 Hectare Property, Perimeter: Need shape and dimensions, Area: 40,000 m²

3F Volume 70

a. 8,000cm^3, b. 125,680cm^3, c. 65,450cm^3

d. TBC

3G Getting it right 71 //applied measurement task

3H Volume - Fluids 73

1 1. How much an object or 'container' can hold. 2. litre

3. when using chemicals, 4. in medicine

2-4. //applied investigative task

Applied

a. 20ml milk, b. 6x20×10=1,200ml cream

c. 2x8x10 = 160 icing sugar ; 100x10=1kg chocolate

3L **Volume - Fluid units** 74

a. Milliliters in 5 tablespoons, 100 ml

b. Milliliters in 6 teaspoons, 30 ml

c. Milliliters in 9 3-litre bottles, 27,000 ml

d. Litres in 3.5 megalitres, 3,500,000 litres

e. "Bad" Fluid consumption in a week: Subjective (e.g., sugary drinks, alcohol)

f. "Good" Fluid consumption in a week: Subjective (e.g., water, milk)

g. Litres of Water for an average backyard swimming Pool: 20,000 to 40,000 litres

h. Litres of Water for an Olympic-sized swimming pool: About 2,500,000 litres

i. Cost of bottled water per litre: Typically $1 to $3

j. Cost of tap water from home per litre: Typically 2c to 5c

k. Capacity of a fuel tank for a motorbike: 10 to 20 litres

l. Capacity of a fuel tank for an SUV: 60 to 100+ litres

m. Cooking and baking

n. Medical contexts to measure the volume of fluids for syringes, medications, or other healthcare-related purposes

2-4. //applied investigative task

3J Goldilocks 76 //applied investigative task

3K Weight 77 //applied investigative task

3L Temperature in action 78-79 //applied investigative tasks

- Hottest temperature ever in Australia: The highest recorded temperature in Australia was 50.7°C (123.3°F) in Oodnadatta, South Australia, on January 2, 1960.
- Coldest temperature ever in Australia: The lowest recorded temperature in Australia was -23.0°C (-9.4°F) at Charlotte Pass, New South Wales, on June 29, 1994.
- A caffè latte: A caffè latte is typically served at around 60-70°C (140-160°F), but this can vary depending on personal preference and the serving establishment.
- Car radiator fluid after a long drive: The temperature of car radiator fluid after a long drive can vary significantly depending on the vehicle's operating conditions, but it can reach temperatures exceeding 90°C (194°F).
- A bath suitable for a baby: A bath suitable for a baby is typically around 37°C (98.6°F), which is close to normal body temperature.
- A shop fridge for milk: The temperature of a shop fridge for milk is usually set between 1-4°C (33.8-39.2°F) to keep the milk fresh and prevent bacterial growth.
- Healthy human temperature: The average healthy human body temperature is around 36.5-37.5°C (97.7-99.5°F), but it can vary slightly depending on individual factors.
- A human with a fever: A fever is generally considered to be a body temperature above 38°C (100.4°F). The specific temperature at which a fever is diagnosed can vary depending on medical guidelines and individual circumstances.

3M Measurements 80

a. 37m   b. 85m^2 c. 0.9m^2 d. 6m^2, 7.2m^3 e. 0.442m^2

2. Yard = 85m2

Adding the areas of the compost, cubby house, and fountain: 0.9+6+0.442≈7.342 square metres

85 less 7.342 =

77.66 square meters

3. //applied investigative task

3N Stop the goats 81

2. 1 acre = 4046.9m2 so 2.5 acres= 10,117m2 The Sq root of 10,117m2 = 100.6 'lineal' metres.
So make the square property border 101 metres to be sure.
P = 100m*4 = 400m of fencing.
3. Area = 10,117m^2 or 10,120m^2 approx.
4. 10,120m^2 x 40% = 4,048m^2 therefore 6,072m^2 is left for the veggie patch.
5. Volume =3.142 x r^2 x h = 3.142 x (0.45)2 x1.6 = 3.142 x 0.2025m^2 x 1.6m = 1.018m^3
There are 1000 litres in a cubic metre so just over 1,000 litres in the tank (he shouldn't fill it right to the top anyway).
6-7. //applied investigation

3O Combining shapes 82

Part A: a. //applied design task
b-c. Perimeter = 18m of straight edges and 6.284m for the curved section = 24.29m (allow 25m)
c-f. //applied investigation task

Part B: a. No.
b-c. triangle = 1/2 x 4.6m x 4 = 9.2m^2
square = 4 x 4 = 16m^2
semi-circle = 3.14m^2
Total area = 27.34m^2
d. She would need much more than that to allow cutting and 'sewing/blending'.
Approx 42.5m^2 for the rectangle (16m^2) and to cut the triangle shape (18.4m^2) and (8m^2) for the semi-circle and then some extra.

e-f. //applied investigative task

Section 4: Got The Time?

4A It's about time 88 //applied activity

4B Time will tell 89

1. 3:30pm, 5:15pm, p:45pm, 11:30 pm
6am, 4.24am, 9.45am, 7:30pm
8pm, midnight, midday, midnight
2-4. //applied

4C You and time 91 //applied

4D Calculating time 93

1 hour 50 minutes in minutes: 110 minutes
4 hours in minutes: 240 minutes
7 hours 15 minutes in minutes: 435 minutes
210 minutes in hours: 3.5 hours
4.5 hours in minutes: 270 minutes

20 hours in minutes: 1200 minutes

72 hours in days: 3 days

15 minutes in hours: 0.25 hours

7 minutes in seconds: 420 seconds

2.5 minutes in seconds: 150 seconds 10 minutes

45 seconds in seconds: 645 seconds

1,019 seconds in minutes: approximately 16.98 minutes

2-3. //applied investigative tasks

4E How long? 94

3hrs, 3hrs 25 min, 23 hrs 25 min, 10hrs, 47 min, 23 hr 30 min

8 hrs, 10 hr 45 min, 11 hr 15 min, 23 hrs, 6 hr 50 min, 23 hr 45 min

4F Time zones 97

1. Greenwich Mean Time (GMT) is the time standard that was used as a worldwide reference for setting clocks and time zones. It is based on the time at the Royal Observatory in Greenwich, London, which is at the zero-degree line of longitude. GMT serves as a starting point for calculating time differences across the globe.

2. (Ignoring daylight savings times)

Sydney & Melbourne: GMT +10

London: GMT

New York: GMT -5

Tokyo: GMT +9

Beijing: GMT +8

Los Angeles: GMT -8

Berlin: GMT +1

Mumbai: GMT +5:30

3. (Ignoring daylight savings times)

London (from Melbourne 11:00): 01:00

Melbourne (from London 15:30): 01:30 (next day)

Melbourne (from New York 19:30): 10:30 (next day)

Tokyo (from Melbourne 07:30): 06:30

Perth (from Beijing 23:15): 23:15

Sydney (from Los Angeles 17:15): 11:15 (next day)

Adelaide (from Berlin 05:30): 14:00

Brisbane (from Mumbai 12:00): 16:30

4. Possibly 24 hours including stopover. Local time = 08:30 next day. Call time is 17:30 AEST.

5. About 12-14 hours, so somewhere around 11:15 PST (for 14 hour flight).

6. About 15 hours. 06:30 AEST. Then time to get processed and time to get home.

4G Getting around 99 //applied investigative task

4H My timetable 100 //applied investigative task

4I Timetables in action 101 //applied investigative task

4J Rosters in action 103

	MON	TUE	WED	THU	FRI	SAT	SUN
7:00							
8:00							
9:00							
10:00							
11:00							
12:00							
13:00							
14:00							
15:00							
16:00							
17:00							
18:00							
19:00							
20:00							
21:00							
22:00							

4K Timesheets in action 105

1. //applied discussion (it's about taking personal responsibility).

2.

	Date	Start	Finish	Break	Hours Worked	Rate	Total
Monday	19-Aug	8:15	16:36	13:00 to 13:45	7h 36m	$24.73	$187.95
Tuesday	20-Aug	8:15	16:36	13:00 to 13:45	7h 36m	$24.73	$187.95
Wednesday	21-Aug	8:15	16:36	13:00 to 13:45	7h 36m	$24.73	$187.95
Thursday	22-Aug	8:15	16:36	13:00 to 13:45	7h 36m	$24.73	$187.95
Friday	23-Aug	8:15	16:36	13:00 to 13:45	7h 36m	$24.73	$187.95
Saturday							
Sunday							
Totals					38	w/rounding	$939.77

3. Organisation name, employer name, employee no., date period, job classification, age (for juniors), etc..

4. //applied investigative task

4L In my future 106 //applied investigative task

4M My transport costs 107 //applied investigative task

Section 5: Relationships

5A: Relationships 113 //applied task

5B Applied Relationships 114-115 //applied task

5C Proportions 117
1. a 0.60 60% b. 0.125 12.5% c. 0.40 40% d. 0.99 99%
2. a. 1:4 b. 3:4 c. 2:3 d. 1:100
3. a. one to two b. one to eight c. eighty-five to one hundred or eight point five to ten d. six point two five to one hundred
4. Approx: Yellow: 25%, Red: 33%, Blue: 11%, Green: 20%, Purple: 11%

Applied
Individual needs vary based on factors like age, gender, activity level, and specific health conditions.
But possibly: Carbs 50%, protein 30%, fat 20%

5D Ratios 119
1. a. 2:1 b. 4:3 c. 5/3 d. 2.5:1 e. 10:1
2.
a. Fraction: 1/2, Decimal: 0.5, Percentage: 50%
b. Fraction: 1/3, Decimal: 0.333, Percentage: 33.3%
c. Fraction: 1/4, Decimal: 0.25, Percentage: 25%
d. Fraction: 2/, Decimal: 2, Percentage: 200%
e. Fraction: 7/8, Decimal: 0.875, Percentage: 87.5%
f. Fraction: 3/7, Decimal: 0.4286, Percentage: 42.86%
g. Fraction: 4/3, Decimal: 1.333, Percentage: 133.3%
h. Fraction: 16/9, Decimal: 1.778, Percentage: 177.8%
i. Fraction: 4/, Decimal: 4, Percentage: 400%
j. Fraction: 1/100, Decimal: 0.01, Percentage: 1%

3. // applied investigation and discussion

5E Rates 121
1. a. kilometres & hours: speed b. litres & kilometres: fuel consumption c. litres & minutes: water use in shower d. dollars & hours: wage rate
2. a. Fast jogger b. car at speed limit c. jet plane d. echidna
3. a.= 5 l/100km
5 l/100km means the vehicle consumes 5 litres of fuel for every 100 km travelled.
10 l/100km means the vehicle consumes 10 litres for the same distance.
  b. = 7.3 l/100km
7.3 l/100km means the vehicle consumes 7.3 litres of fuel for every 100 km travelled.
7.3 l/100m means 7.3 litres of fuel for every 100 meters travelled. This is equivalent to 730 litres per 100 km, indicating very high fuel consumption
  c. Generally, a motorbike tends to be more fuel-efficient than a car.
4. a. 60 km/hour b. 45 km/hour c. 720 km/hour
d. $50/hour e. $240/day f. $6,500/month or $1,500/week
g. 10 litres/100 km h. 9 litres/100 km i. 6.4 litres/100 km

5F Working the numbers 123
a. 1,125 grams of salmon, 3 eggs, 75 ml of milk, 150 grams of Parmesan, 225 grams of rice, 6 spring onions, 3 garlic cloves
b. 300 km/week, 20 litres/100km, $138 at $2.30 per litre

c. 7.5 km city, then 90 km for country (at 90 kmh), total = 97.5km, time = 1 hour 15 minutes

5G Common formulae 125

➢   Simple Interest Rate

I = P × r × t   where I is the interest, P is the principal, r is the rate, and t is the time in years.

➢   Compound Interest Rate

A = P × (1 + r/n) $^{n \times t}$ where A is the final amount, P is the principal, r is the annual interest rate, n is the number of compounding periods per year, and t is the number of years.

➢   GST to Add to a Price

Original Price x 10%

➢   GST Already in a Price

Total Price / 11

➢   Male Shoe Size Based on Foot Length

Shoe Size (US) = (3 × Foot Length in inches) −24.

➢   Female Shoe Size Based on Foot Length

Shoe Size (US) = (3 × Foot Length in inches) −22.5.

➢   Fuel Economy of a Vehicle - City Driving

Fuel Economy = <u>Fuel Consumed</u>
                     Distance Driven × 100.

➢   Fuel Economy of a Vehicle - Country Driving

This is generally better than city driving due to consistent speeds and fewer stops. Use the same formula as above to calculate it

➢   BMI - Normal Person

BMI = <u>Weight in kg</u>
        Height in meters^{2}

➢   BMI - Muscular Athlete

Same as the formula for BMI, but interpretation can vary.

➢   Cat Years in 'Equivalent' Human Years

No exact formula, but the general estimation is:

•   First year = 15 human years.   Second year = 24 human years (15 + 9).

•   Subsequent years = 4 human years each.

➢   Dog Years in 'Equivalent' Human Years

General estimation:

•   First year = 15 human years. Second year = 24 human years.

•   Each additional year ≈ 5 human years.

➢   Labour Participation Rate

Labour Participation Rate = <u>Labour Force</u>
                                Working Age Population x 100

➢   Unemployment Rate

Unemployment Rate =   <u>Total Unemployed</u>
                                Labour Force   x 100

5H Relationship formulae 127

1. a. Mix (10:1) = 10W plus 1B // or 1W plus 0.1B

b. //applied investigation

c. For 1 cup of rice: Mix = 1R + 2W // or 1:2 rice to water

For 2 cups of rice: Mix = (1R + 2W) + (1R = 1.5W) // or First cup of rice: 1:2 rice to water, then 1:1.5 rice to water thereafter. (Note: the true formula beyond one cup is complex involving 'n' and is more easily understood, and better expressed in words.

d. Shelf = 12S + 3B + 0.8mT // So total required = 6 x (12S + 3B + 0.8mT) or 72 screws, 18 brackets and 6 lengths of timber at 0.8m (4.8m).

2. //applied investigation

3. a. 60 km/h b. 45 km/h c. 41 spring rolls/hour (0.68/min) d. 1000 push-ups/week (approx 143/day)

5I Applying formulae 129

i. 194 ii. 4 iii. -84 iv. 94

2. Shopping: B = 0.6G + 0.125CT + 0.275FG

Barber: Cut = 15 x $1.50 = $22.50

3&4. //applied investigation

Mowing: Standard = $20 + $25/hr Pensioner = $20 + $15/hr

6. //applied investigation (you'd need about 2.56 billion hot dogs to stretch from Earth to the Moon.)

5J **Developing formulae** 131

1.

i. Transposition: X = 100 - 15   Answer: X=85.

ii. Transposition: X = 100 + 15 Answer: X=115.

iii. Transposition: X = 150/ 15 Answer: X=10

iv. Transposition: X = 15 × 15 Answer: X=225

v. Transposition: 50 = 3Y + 20, then 30 = 3Y, then Y = 30/3 Answer: Y=10.

vi. Transposition: 2X = 550 - 50, then 2X = 500, then V = 500/2 Answer: X=250.

vii. Transposition: 900 = 3Y - 150, then 1,050 = 3Y, then 1,050/3 = Y Answer: Y=350.

viii. Transposition: X - 20,000 = 40,000 + 10,000, then X - 20,000 = 50,000, then X = 70,000 Answer: X=70,000.

2. $10: $400 per week // $20k per year // 21.3% of AWE //A very low wage, except for a young junior e.g. aged 15 or 16

$40: $1,600 per week // $80k per year // 85.4% of AWE //A decent wage, especially if a younger worker, but still below the median AWE

5K See for yourself 133 //applied analytical task

5L Visualisations 135 //applied investigative task

6. Data and Systematics

6A **Unit 4 Requirements** 143 //applied

6B **Data and information** 144-145
1. //applied
2. 10 3. To line up based on place value, easier to compare and calculate.
4. Set 2 lowest to highest, Set 2 highest to lowest
5.
- Student test marks out of 100, listed alphabetically. Could be sets 1,4,5,6
- Number of errors per worker over a month ranked best to worst. Set 2
- Number of cola beverages (375ml) consumed in a month. Could be sets 1-6 (but 98 is a lot!)
- The age at which people first travelled overseas. Sets 1-6 (but age 98 is a stretch)
- Volume of sales of different products per day. Could be sets 1-6
- Text messages sent by people per day. Could be sets 1-6

6C **Organising data** 146-147
1. Alphabetically
2. Days that an amount owed has been outstanding, debit and credit.
3. Justification
4. Stotts, S.J.
5. Sturat & Johns p/l, account is in credit, may have been given a refund for faulty goods.
6. Stuart, Stewart & John each of $278
7. Stew Slotz and also Stuart, Stewart & John
8. Stuart Johns
9. John Stuart (over 90 days) $1,950-$1,760 = $190
10. Oldest Stewart Co. newest Stoltenberg Inc
11. Stew Slotz balance = $870, likely transposition error
12. This Month ($) $19,703 /8 = $2,462.88
This Quarter ($) $45,594 /8 = $5,699.25
Year-to-Date ($) $70,094 /8 = $8,761.75
Balance ($) $8,995 /8 = $1,124.375
Days 244 /8 = $30.5

6D **Collecting data** 149 //applied investigation

6E **Systematics** 151
1. //applied
2. a. Abdi the Painter:
Inputs: Measurements of the internal dimensions of a room (length, width, height).
Outputs: Calculated area and volume of the room.
Analog Devices: Measuring tape, laser distance meter.
Digital Devices: Smartphone with measurement apps, computer for more complex calculations.

b. Bogdan the Basketball Player:
Inputs: Distance covered during each training session.
Outputs: Total distance run, distance per session.
Analog Devices: Pedometer, fitness tracker watch.
Digital Devices: Smartphone with GPS tracking, fitness tracking apps.

c. Cyris the E-sports Gamer:
Inputs: Game data, strategies, opponent patterns.
Outputs: Strategies to beat level bosses.
Analog Devices: None directly applicable.
Digital Devices: Gaming console or computer, online forums or guides, gaming peripherals for better control.

d. Drake the Cook:
Inputs: Temperature readings of roast chicken.
Outputs: Internal temperature of the chicken.
Analog Devices: Food thermometer.
Digital Devices: Digital food thermometer, kitchen oven with digital temperature display.

e. Eddie Saving for a Car:
Inputs: Current spending habits, financial goals.
Outputs: Strategies to reduce spending and save $100 a week.
Analog Devices: Budgeting journal, cash envelopes.
Digital Devices: Personal finance apps, budgeting software, online banking platforms.

f. Fry the Organic Vegetable Grower:
Inputs: Seasonal variations, growth conditions.
Outputs: Optimised growth strategies.
Analog Devices: Soil pH meter, moisture meter.
Digital Devices: Weather forecasting apps, agricultural databases, online forums for organic gardening tips.

g. Grant Planning a Holiday:
Inputs: Budget, travel expenses.
Outputs: Itinerary within the budget.
Analog Devices: Travel planner notebook.
Digital Devices: Travel budgeting apps, flight and accommodation booking websites, online travel guides.

h. Ha the Diabetic:
Inputs: Blood glucose readings.
Outputs: Monitoring blood glucose levels.
Analog Devices: Glucometer.
Digital Devices: Continuous glucose monitoring system (CGM), smartphone apps for tracking blood sugar levels.

i. Inga the Vegan Personal Trainer:
Inputs: Nutritional data of various plant-based foods.
Outputs: Most efficient plant-based protein sources.
Analog Devices: Kitchen scale.
Digital Devices: Nutrition tracking apps, online databases of nutritional information, fitness wearables with nutrition tracking features.

j. Jorge Running a Small Café:
Inputs: Costs of ingredients, sales data.
Outputs: Profit margins for different types of coffees.
Analog Devices: Sales register.
Digital Devices: Point-of-sale (POS) system, accounting software, spreadsheet applications for profit calculations.

6F **Checksheets** 153 //applied research and investigation

6G **Collating data** 154 //applied research and investigation

6H **Frequency** 155 //applied research and investigation

6I **Spreadsheets** 156-157
1. Types of expenditure and forms of income; time range = April to July.
2. Car, socialising, phone, other
3. Work, ebay, Etsy, other
4. A1 to F19
5. totals, averages and overall surplus or deficit

6. sum; average;   calculations
7. Very much so!
8. If you get the formulae right, it's very effective
9 - 10. //applied

6J **Which graphs?** 159 //applied investigation and discussion

6K **Line graphs** 160-161
A. //1-4. applied graphing activity   5. seasonal variations // have special offers during quiet months
B. //1-3. applied graphing and analysis activity
4. It's the biggest seller. 5. Need profit margin on each, demographics and sales per month (an item might have peaked and others might have more potential for sales growth!)

6L **Bar graphs** 162-163
A. //applied graphing activity
B. //applied graphing and analysis activity

6M **Pie charts** 164-165
A. //applied graphing activity
B. //applied graphing and analysis activity

6N **Average - Mean** 167
A1. $1483/20 = $74.15
2. $1483/13 = $114.08 (i.e. 7 students with no income)
3. $1483/13 = $114.08 (i.e. 16 employed students but 3 of these didn't work)
4. $1483/16 = $92.69 (i.e. 16 employed students in total)
B. //applied

6O **Average - Median** 169
A1. $0,$0,$0,$0,$0,$0,$0,$37,$45,$45, $54,$73,$76,$76,$98,$112,$118,$124,$175,$450
2. $49.50 (i.e. 45+54/2)
3. $76 (i.e. middle of 13 values)
4. $63.50 (i.e. 54+73/2)
B. //applied

6P **Average - Mode** 171
A1. $0 = 7, $37 = 1, $45 = 2, $54 = 1, $73 = 1 $76 = 2 ,$98 = 1 ,$112 = 1 ,$118 = 1 ,$124 = 1 ,$175 = 1, $450 = 1
2. $0 (most frequent with 7)
3. Both $45 and $76 appear 2 times, they are the modes for the employed students who worked last week.
4. $0 (still most frequent with 3).
5. Not useful at all in this situation!
B. //applied

6Q **Spread and range** 173
a. mean = $3m b. median = $2.05 c. $10m d. $0.1m
e & f. discussion
g. mean = $2.32m median = $2.05m Much better representation now.

h. mean = 3.2km i. median = 1.1km j. mode = 0 k. 0 & 17.8km
l. Median is most suitable as one outlier is very high and many didn't jog at all so mean is not as useful
m. The zeros should be removed - they didn't jog so it's a 'non'-result!

n. mean = 10.3 hrs p. median = 9 hrs q. mode = 8 hours r. 2 hrs and 28 hrs
s. All 3 averages are useful in this case. Use mean to get a simple average. Use mode to see most common. Use median as a 'compromise' between the two other methods. All three provide answers, it just depends on what the questions is!
t. The more data items the more accurate averages of all types will be. There will be less skewing.

7. Location and Direction

7A **Maps and bearings** 180-181 //1. applied
2. a-f //applied visual task g.ESE h.WNW i.NNE j.225° k.67.5^o l.337.5^o
3 & 4. //applied

7B **Angles** 183
1. Acute: An angle that is less than 90°. Right: An angle that is exactly 90°. Obtuse: An angle that is more than 90° but less than 180°. Straight: An angle that is exactly 180°. Reflex: An angle that is greater than 180°. Full: An angle that is 360°.

2. //applied visual task   3. //applied

7C **Language of location** 185 //applied visual task

7D **Going downtown** 186-187 //applied visual mapping task

7E **Giving instructions** 189 //applied mapping task

7F **Coordinates** 190 //applied investigative task

7G **Making and using maps** 191 //applied mapping task

7H **Drawing directions** 192-193 //applied mapping task

7I **What would you do?** 194-195 //applied discussion and problem-solving task

7J **Apps v Maps** 196 //applied discussion

7K **Old-school v Nu skUL** 197 //applied investigative task

7L **Get out and fill up** 198-199 //applied investigative mapping task

8. What's the Chances?

8A **What are the chances?** 207
1 out of 2 50%; 1 out of 2 50%; 1 out of 4 25%;
1 out of 6 16.7%; 1 out of 6 16.7%; 1 out of 36 2.7%;
Who knows?; European rules = 48.6% (just under 1 in 2 chance); Seems to be almost always!!

8B **Uncertainty and likelihood** 209 //applied discussion

8C **Probabilities** 211
1
- Drawing a club card (25%) - fairly low chance
- Rolling a 3 (6-sided die) (16.67%) - low chance
- Tossing a head, and then 2 tails (12.5%) - low chance
- Tossing a tail, then 2 heads (12.5%) - low chance
- Rolling a 6 (8-sided die) (12.5%) - low chance
- Guessing Melbourne Cup winner (4.17%) - very low chance
- Spinning a 5 (on roulette wheel) (2.70%) - very low chance
- Being attacked by a shark (approx. 0.0000087%) - extremely low chance
- Winning Saturday lotto (0.000000123%) - almost no chance

2. 50/50 = even chance; 3 in 4 = fairly high chance; 1 in 10 = very low chance; 99 out of 100 = very high chance; 1/2 = even chance; 1 in 36 = very low chance; 10 in 15 = fairly high chance; 2 chances in 5 = fairly low chance

8D **A toss of the coin** 213
1. 50% 2. 50% 3. 50% 4. 50% 5. 25% (and the coin always 'resets', it's random!)
a. You cannot predict, the outcome is random.

8E **Life could be a dream** 215
1 & 2. //applied investigation and discussion
What are your chances?

- 6 from 45 = 1 in 8,145,060 which will take 3,232.7 years (if you're lucky that is!)
- 6 from 40 = 1 in 3,838,380 which will take 1,476.3 years (if you're lucky that is!)
- 5 from 40 = 1 in 18,818
- 4 from 40 = 1 in 456

4. Increasing the number of balls from 40 to 45 made winning more difficult. The odds of winning Division 1 become higher, meaning fewer winners overall. This reduction in the frequency of payouts for the top prize allows the jackpot to accumulate over multiple draws, thereby increasing the potential prize pool. Larger jackpots tend to attract more players, which further increases the prize pool through higher ticket sales.

5. No. We don't live over 1,300 years anyway!

8F **Predicting** 219 //applied investigative and analysis

8G **Making it rich?** 220-221 //applied investigative and analysis
A. $10,000
3% for 10 years: $13,439   6% for 10 years = $17,908
3% for 20 years: $18,061   6% for 20 years = $32,071
3% for 30 years: $24,273   6% for 30 years = $57,435
3% for 40 years: $32,260   6% for 40 years = $102,857

B. $50/week compounded annually
3% for 10 years: $29,806   6% for 10 years = $34,270
3% for 20 years: $69,863   6% for 20 years = $95,643
3% for 30 years: $123,696   6% for 30 years = $205,551
3% for 40 years: $196,043   6% for 40 years = $402,381

C. $50/week compounded monthly
3% for 10 years: $30,277   6% for 10 years = $35,507
3% for 20 years: $71,132   6% for 20 years = $100,109
3% for 30 years: $126,260   6% for 30 years = $217,645
3% for 40 years: $200,646   6% for 40 years = $431,490

D. //applied investigation and numerical analysis

9. Working with Money

9A **Money and me** 228-229
1 & 2. //applied
3. a. $41.40 b. $58.46 c. $3750
d. $750 e. $456 f. $183.33
g. $1,475 h. -$22,500 i. $8,500
j. $497m k. $6.34b l. $18b = $4.5b/year

4 & 5.
- **Spreadsheets (e.g., Microsoft Excel, Google Sheets)**:
Recording: Create tables to log income, expenses, and savings.
Calculating: Use formulas for addition, subtraction, percentages, and averages.
Budgeting: Set up budgets with categorised expenses and income.
- **Accounting Software (e.g., QuickBooks, Zero)**:
Recording: Track financial transactions automatically.
Calculating: Generate financial reports and perform detailed calculations.
Invoicing: Send and track invoices for business expenses.
- **Personal Finance Apps**
Recording: Automatically sync bank accounts and categorise expenses.
Calculating: Monitor spending against budget and calculate savings goals.
Alerts: Set up alerts for upcoming bills and low balances.
- **Project Management Tools**
Recording: Track project expenses and allocate budgets.
Calculating: Calculate total project costs and forecast future expenses.
Reporting: Generate financial reports for project management.
- **Automated Calculators (Online or physical devices)**:
Recording: Manual entry of data for quick calculations.
Calculating: Perform on-the-go calculations for expenses, taxes, and percentages.

9B **Discounts** 231
a: New Price: $81 Total Discount: $9
b: New Price: $100 Total Discount: $25
c: New Price: $105 Total Discount: $15
d: New Price: $47 Total Discount: $12
e: New Price: $45 Total Discount: $5
f: New Price: $88 Total Discount: $22
Total Discount Amount = $88
Total Original Price = $554
Total New Price = $466
Total Discount Percentage ≈15.88%

2. a. Order 100 units @ $2.75 and 200 units @ $3.50 with a 10% large order discount
- **Original Total Cost:**
  - 100 units @ $2.75: 100 × $2.75 =$275
  - 200 units @ $3.50: 200 × $3.50 =$700
  - Original Total Cost = $275 + $700 = $975
- Discount Amount: **10% of $975 = 0.10 × $975 = $97.50**
- New Total Cost: **$975 − $97.50 = $877.50**
- Unit Cost After Discount: Total Units = 300 Average Unit Cost After Discount = $877.50 / 300 ≈ $2.93

b. Order 2,000 units @ $40 with a 12.5% trade discount
- Original Total Cost: 2,000 × $40 = $80,000
- Trade Discount Amount: 12.5% of $80,000 =0.125 × $80,000 = $10,000
- New Total Cost: $80,000 − $10,000 = $70,000
- Unit Cost After Discount: $70,000 / 2,000 = $35

Repeat order within 30 Days with twice the discount (25%)
Discount: $20,000   2. New Total Cost $60,000   3. Unit Cost: $30

c. Buy bakery ingredients with a 40% trade discount + 5% off on item sub-totals exceeding $1,000
Original total cost:
- 10 @ $100: 10 × $100 = $1,000
- 50 @ $50: 50 × $50 = $2,500
- 120 @ $10: 120 × $10 = $1,200
- 500 @ $5: 500 × $5 = $2,500

Original Total Cost = $7,200
Trade Discount (40%): $2,880   After Trade Discount: $4,320

5% Discount on Item Sub-Totals Exceeding $1,000:
- $1,000 (10 @ $100): No further discount
- $2,500 (50 @ $50): 5% of $2,500 = $125
- $1,200 (120 @ $10): No further discount
- $2,500 (500 @ $5): 5% of $2,500 = $125

Total additional discount = $250
New cost after additional discount: $4,320 – $250 = $4,070   Total discount: 43.5%

d. Order 5,000 units @ $6.50 with a 30% trade discount, 2.5% long-term client discount, and 1.25% early payment discount
- Original Total Cost: = $32,500
- Trade Discount (30%): = $9,750
- New Total Cost After Trade Discount: = $22,750
- Long-term Client Discount (2.5%): = $568.75
- New Total Cost After Long-term Client Discount: = $22,181.25
- Early Payment Discount (1.25%): = 0.0125 × $22,181.25 = $277.27
- New Total Cost After Early Payment Discount: = $21,903.98

9C Making change 232-233
1. a. Total Cost: $17.50 Change from $20 = $2.50   b. Total Cost: $35.50 Total Paid: $36 Change = 50c
c. Not much!!! // find out! d. Total Cost: $279.98 Amount Paid: $300 Change = $20 (rounded)
3. a. $60.05 b. $172.50 so $7.50 c. $569.99 so $30 (rounded) d. $80 so $6.90 (rounded) e. $54.50 so $45.50
f. $57.20 given $60.10 so $2.90 g. $184.90 = not enough cash!

9D Compare the basket 235 //applied investigation
Totals = Boles: $44.73 Boles Online: $45.24 Baldi $29.76 IPA: $41.39 www.Ome: $24.44 but no chicken thighs!

9E Converting currency 238-239
1-9. //applied current investigation

Stage 2

	US	Aud	Price in $Aud
	100,000	0.70	$ 142,857.14
Today	100,000	???	
2022	100,000	0.6889	$ 145,158.95
2020	100,000	0.6863	$ 145,708.87
2018	100,000	0.7391	$ 135,299.69
2012	100,000	1.0191	$ 98,125.80

5. <u>down</u> <u>2012</u> <u>1.0191$US</u> <u>$98,125.80</u>
6. <u>up</u> <u>2022</u> <u>0.6889$US</u> <u>$145,158.95</u>

Stage 3
1a. more   cheaper   more   harm
1b. less   dearer   fewer   benefit
1c. fewer   dearer   fewer   harm
1d. more   cheaper   more   benefit

2. Low dollar can lead to more exports but means that imported machinery costs more.

9F **Sales receipts and quotes** 241 //applied analytical investigation

9G **Purchase orders and invoices** 242 //applied analytical investigation

9H **Bank statements** 243

DR	CR	Balance
		214.00
56.00		158.00
17.50		140.50
	145.00	285.50
50.00		235.50
75.00		160.50
	145.00	305.50
100.00		205.50
15.00		190.50
	145.00	335.50
19.50		316.00
17.50		298.50
100.00		198.50
	290.00	488.50
11.00		477.50
20.00		457.50
100.00		357.50
3.00		354.50
	222.50	577.00

9I **Account statements and bills** 244 //applied informational investigation

9J **Financial documents** 245 //applied informational investigation

9K **Keeping it safe** 247 //applied discussion

9L **Productivity** 249 //applied investigation & discussion and...
2. a. 2.5/hour 20/day b. 8/hour 64/day c. 12/hour 96/day
d. 18/hour 144/day e. 1.5/hour 12/day f. 4.5/hour 36/day

3 -4. //applied discussion

9M **Fixed and variable costs** 251
To cover the fixed costs, the café needs to make approximately $673.08 per week (52 weeks).
50% transactions are coffee: ave margin = $3   50% transactions are coffee & snack: ave margin = $7
If coffee only = 225/week ($675)   If coffee & snack only = 97/week ($679)
So based on current profiles will need:
113 coffees = margin of $339 (over 5 days = 23 per day)
48 coffee & snack = margin of $336 (over 5 days = 10 per day)
Total = $675 plus a little more

10. Managing Money

10A **My money management** 257 //applied discussion

10B **My budgets** 260-261 //applied financial investigation

10C **Wage rates** 263 //applied investigation

10D **Apprentice & trainee wages** 264-265
Part A

	55%	60%	80%	95%
20	$ 11.00	$ 12.00	$ 16.00	$ 19.00
	$ 418.00	$ 456.00	$ 608.00	$ 722.00
	$ 21,736.00	$ 23,712.00	$ 31,616.00	$ 37,544.00
25	$ 13.75	$ 15.00	$ 20.00	$ 23.75
	$ 22.50	$ 570.00	$ 60.00	$ 02.50
	$ 27,170.00	$ 29,640.00	$ 39,520.00	$ 46,930.00
30	$ 16.50	$ 18.00	$ 24.00	$ 28.50
	$ 27.00	$ 684.00	$ 12.00	$ 1,083.00
	$ 32,604.00	$ 35,568.00	$ 47,424.00	$ 56,316.00

Part B 1.

School leaver Wage level A	...and has completed Year 10	...and has completed Year 11	...and has completed Year 12
Just left school	$384.30	$423.10	$503.30
	$12.64	$13.92	$16.56
	$19,983.60	$22,001.20	$26,171.60
Plus 1 year out of school	$423.10	$503.30	$585.75
	$13.92	$16.56	$19.27
	$22,001.20	$26,171.60	$30,459.00
Plus 2 years out of school	$503.30	$585.70	$681.60
	$16.56	$19.27	$22.42
	$26,171.60	$30,456.40	$35,443.20

10E **Timesheets** 266
1.//applied
2.

???: Weekly Timesheet											
Name: ???						Work period: ???					
Employee number: ???						Classification: Retail Worker Level 1					
	Date	Start	Finish	Break	Hours Worked	Rate	Total	Break	Over time	Rate	Total
Monday	19-Aug	8:45	17:30	13:00 to 13:45	8	$21.38	$171.04				
Tuesday	20-Aug	8:45	17:30	13:00 to 13:45	8	$21.38	$171.04				
Wednesday	21-Aug	8:45	17:30	13:00 to 13:45	8	$21.38	$171.04				
Thursday	22-Aug	8:45	17:30	13:00 to 13:45	8	$21.38	$171.04	17:30 to 17:50	2	$32.07	$64.14
Friday	23-Aug	8:45	19:30	13:00 to 13:45	8	$21.38	$171.04				

Saturday												
Sunday												
Totals					40		$855.20			2		$64.14
												$919.34

10F Pay slips 267

1. //applied

2.

Week 1

Hairex Tensions	*ABN: 23 456 987 01*	*Date: applied*		
Employee:	*applied*	*Period: applied*		
Entitlements			Deductions	
Ordinary hourly rate:	Total	Total		
$17.50	**14**	**$245.00**		
Overtime hourly rate:				
$21.88	**0**	**$0.00**		
Gross entitlement		**$245.00**	Tax deducted:	**$30.63**
Net entitlement		**$214.38**		
Paid into bank account: *applied*	BSB: *applied*			
Gross entitlement	Year to date	$245.00	Year to date	**$30.63**
Net entitlement	Year to date	$214.38		
Week 2				
Hairex Tensions	*ABN: 23 456 987 01*	*Date: applied*		
Employee:	*applied*	*Period: applied*		
Entitlements			Deductions	
Ordinary hourly rate:	Total	Total		
$17.50	**14**	**$245.00**		
Overtime hourly rate:				
$21.88	**6**	**$131.25**		
Gross entitlement		**$376.25**	Tax deducted:	**$47.03**
Net entitlement		**$329.22**		
Paid into bank account: *applied*	BSB: *applied*			
Gross entitlement	Year to date	$621.25	Year to date	**$77.66**
Net entitlement	Year to date	$543.60		
Week 3				
Hairex Tensions	*ABN: 23 456 987 01*	*Date: applied*		
Employee:	*applied*	*Period: applied*		
Entitlements			Deductions	
Ordinary hourly rate:	Total	Total		
$17.50	**14**	**$245.00**		
Overtime hourly rate:				
$21.88	**6**	**$131.25**		
Gross entitlement		**$376.25**	Tax deducted:	**$47.03**
Net entitlement		**$329.22**		
Paid into bank account: *applied*	BSB: *applied*			
Gross entitlement	Year to date	$997.50	Year to date	**$124.69**
Net entitlement	Year to date	$872.82		

10G Me and money management 269 //applied discussion

10H Loan repayments 272
i. $119/month over 5 years; total = $7,137 (assume no fees which is unlikely)
ii. $55/fortnight over 5 years; total = $7,121 (assume no fees which is unlikely)
iii. $122/fortnight over 5 years; total = $15,885 (assume no fees which is unlikely)
iv. $117/fortnight over 5 years; total = $15,198 (assume no fees which is unlikely)

10I Investigating credit 273
1. Lanny
a. Lanny would originally pay back $5,862 over 19 years 4 months!
b. Lanny would now pay back $2,734 over 3 years 10 months!
c. Lanny would now pay back $2,353 over 2 years.
d. Lanny would now pay back $2,148 over 11 months.

2. Tegan
a & b. Amount borrowed: $800.00
Establishment fee: (20% of amount borrowed) $160.00
Monthly fees: (4% each month) $384.00
Total to be repaid: $1,344.00
Fortnightly repayments: (26 payments) $51.69
c. Effective interest = $544/ $800 = 68%!!!!!!!!!!!!!!!

10J Credit cards and loans 274-275 //applied financial investigation

10K Income tax 279
a. $0 0% Medicare (single person no private health) $0 new ave: 0
b. $865.26 3.8% Medicare (single person no private health) $110 new ave: 4.3%
c. $2,907 8.7% Medicare (single person no private health) $670 new ave: 10.7%
d. $8,342 15.2% Medicare (single person no private health) $1,100 new ave: 17.2%
e. $14,482 19.8% Medicare (single person no private health) $1,500 new ave: 21.8%
f. $40,567 27% Medicare (single person no private health) $3,000 new ave: 29%
g. $128,167 36.6% Medicare (single person no private health) $7,000 new ave: 38.6%
h. $420,667 42.1% Medicare (single person no private health) $20,000 new ave: 44.1%