

Numeracy VM Unit 1 - Coursebook

(Note: Teachers - This is draft version 1 as at May 2024. If you find any errors, or typos please let me know.)

Section 1: Working the Numbers

1C Work it out 7

a.10 b. applied c. \$12/ hour d. applied e. applied f. Need to save >\$60 g. We can't tell without knowing the gender of the 'names', so we shouldn't jump to conclusions.

1D Basic calculations 1 9

1. 1,840.5 e.g. -45 2. -48.5

1E Basic calculations II 10

a. 96 b. 156 c. 927 d. 750 e. 3,024 f. 34,410 g. 6 h. 2 i. 6 j. 38.5 k. 3.5 l. 3.25

1F Quick quiz 11

1. 121 2. 251 3. 1,000 4. 5 5. 68 6. 101 7. -7 8. 55 9. 182 10. 540 11. 35 12. 31 13. 7 14. 19.5 15. 52 16. 152 17. 24 18. 37.5 19. 7/8. 20. 1

1G Who's paying more? 12

Selma \$9,618 vs Linley \$9,6000

1H Rounding 13

Albrut - mistakes by rounding down both amounts. Total cost = $\$220 \times 44 = \$9,680$. He underestimated.

1I Round it out 14

1a. Ilsa 12,600ml/week 655,200ml/year (She is buying the most expensive size/and not in bulk)
1b. John 1,150 kg/workout 3,450 kg/week
2. a. Katie \$156/week \$13/hour b. Robert \$120/week \$15/hour c. Don't judge a job based just on wage rate, there are so many other factors!

1J Mental work 15 //applied

1K Working together 17

1. a. 15 b. 12 c. 5 d. 0
2. a. 871 b. 134 c. Approx 39.60
3. \$13 (singles) vs \$9.85 (for packs)

1L Fractions and Decimals 18

1/4, 1/2, 3/5, 2/3, 7/10, 5/7, 9/10, 19/20, 5/4, 4/3, 3/2, 5/2, 7/2, 11/3, 27/4
0.25, 0.5, 0.6, 0.67, 0.7, 0.71, 0.9, 0.95, 1.25, 1.33, 1.5, 2.5, 3.5, 3.67, 6.75

1M Calculating fractions & decimals 19

a. 7/4 b. 29/10 c. 12.5 d. 25/8
e. 26 f. 1.05 f. 6.875 g. 3

1N 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

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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
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1O Percentage calculations 22

1. 1. 50 2. 50 3. 72% 4. 2.77% 5. \$50 6. \$12.02
2. 12.5% 3. 6.25% 4. 62.5g, 31.25g 5. More sharing vs too small
6. 53.04 grams, To cut costs

1P Numbers as words 24

- a. \$3,400 b. \$2,600, c. \$800-\$720 = \$80
- b. 2kg butter, 16 eggs, 1.6kg sugar, 4kg flour

1Q Slippery numbers 25

- a. Not very fast, b. small eggs, c. tiny steak, d. just hyperbole, e. lot of fat per 100gram, f. a bit low, g. yeh right!

Section 2: Shapes and Objects

2A Basic shapes 30

circle, square, rectangle, oval or ellipse, triangle, pentagon, hexagon, octagon

2B 3D shapes 31

cube, pyramid, rectangular prism, ellipsoid, sphere, octahedron

2C Describing shapes 32 //applied visual task

2D Recognising shapes 33 //applied design task

2E Cube net 34 //applied design task

2F Solid objects 35

1. Triangle 2-5. //applied design task

2G Shapes at work 36-37

1. //applied visual task 2. To fit more in the track/van. 3. To minimise costs. Yes you have a limited amount of time, and fuel also costs. 4. applied 5. They can't display as many; nor so easily.

2H Scale and ratio 39 //applied measuring and design task

2I Transforming objects 41

reduction (dilation), rotation 180° , rotation 90° or 270° , dilation & rotation 180° , reflection, reduction & rotation 270°

2J Floorplan 42 //applied design task

2K Working plans 44 //applied measuring and design task

2L Plan symbols 45 //applied investigative task

2M Plans 46 // applied investigative task

2N Classroom floorplan 47 //applied design task

2O Organic infographic 49 //applied analytical and design task

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Section 3: Measure by Measure

3A Measuring 55

1-2.

Length: Common Units: Metre (m), centimetre (cm), millimetre (mm), kilometre (km)

Measuring Devices: Ruler, tape measure, caliper, micrometre, odometre (for longer distances)

Mass (Weight): Common Units: Gram (g), kilogram (kg), tonne (t)

Measuring Devices: Weighing scale, balance

Volume: Common Units: Litre (L), millilitre (mL), cubic metre (m³), cubic centimetre (cm³)

Measuring Devices: Graduated cylinder, beaker, measuring cup

Temperature: Common Units: Celsius (°C), Fahrenheit (°F), Kelvin (K)

Measuring Devices: Thermometer (digital or analogue)

Distance: Common Units: Metre (m), kilometre (km) Measuring Devices: Odometer (in vehicles), pedometer (for counting steps), GPS devices Capacity (Volume):

Common Units: Litre (L), millilitre (mL), gallon (US or imperial), pint, quart

Measuring Devices: Measuring cups, pitchers, bottles

Price/Cost: Common Units: Currency (AUD, cents, USD, EUR, GBP, etc.)

Measuring Devices: Point of sale system, cash register, price tag

Common Units: Second (s), minute (min), hour (hr), day, week, month, year

Measuring Devices: Clock (analogue or digital), stopwatch, timer, calendar, sundial (for daylight tracking)

3B Units of measurement 57

1. millilitre, cm, kg, Celsius //situations = applied

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

3. a. 2.5 kg, b. 375ml, c. 500m,

d. 275mm, e. 250ml, f. km 0.5km,

g. 5 minutes, h. 120minutes, i. 37.78⁰ C

3C Estimating 59 //Applied

3D Distance 60

1. 2,400mm 2. 17,300m 3. 106.5 4. applied 5. 3,200m 6. applied 7. 42.195km 8. 12,600km 9. 1.6km + 2km + 4km + 2km + 4km = 13,600m or 13.6km 10. 800-840km (depending on how many weeks), approx to Sydney or Adelaide.

3E Perimeter - Rectangle 61

i. 30m ii. 600 (10 per metre + overlap of 10 per metre) = 20 x 30 = 600 palings

3F Perimeter - Triangle 62

i. 36cm ii. 51cm iii. 140cm iv. 164cm

3G Making it work 63 //applied investigation

3H Short and long 64 //applied investigation

3I Length in action 65

1. //applied measuring task

2. b. 16m e. 16.8 + 15.2 = 32m f. \$1,600 GST exc.

3J Area in action 67

box 600cm² land = 336m² //applied

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3K Volume - Solids 69

1. Box 1: 960 cm^3 Box 2: $1,920 \text{ cm}^3$ Box 3: $5,400 \text{ cm}^3$ Box 4: $11,000 \text{ cm}^3$

2. each box = $135,000 \text{ cm}^3$,

There are 16 boxes facing with a total width of 180cm

There are 4 layers stacked with a total height of 200cm

To fit neatly there must be 4 columns in total, i.e 4 x 45 smaller boxes which = 180cm // the same as 3 x 60cm for the larger boxes

Assume rows 1&3 (bottom to top) extend back $45 \times 4 = 180\text{cm}$

Assume rows 2&4 extend back $60 \times 3 = 180\text{cm}$

So its $200\text{cm} \times 180\text{cm} \times 180\text{cm} = 6,480,000 \text{ cm}^3$ or 6.48m^3

or: $48 \times 135,000 \text{ cm}^3 = 6,480,000 \text{ cm}^3 = 6.48\text{m}^3$

3. //applied

3L Volume - Fluids 70

1. how much fluid a container can hold, 2. litre,

3. with chemicals such as bleach, 4. in medicine and health-care

3M Food and drink 71

1-2. //applied

Treat...

1. 20ml 2. cream = 1,200ml (if tablespoon = 20ml or approx 900 if 15ml) 3. icing sugar = approx 160g; chocolate = 1kg

3N Volume - Fluid units 72-73

a. 75-100ml b.25ml c.3,000ml d.2,000,000l e&f. //applied g. approx 26,000 to 35,000l h. 2.5 millionl i. \$1.50 to \$5 j. 0.02 to 0.05c k. 10-20l l. 70-100l m. cooking n. medicine dosages

3O Temperature in action 74-75

1. applied; 50.7° at Oodnadatta; 1960;

applied; -23° at Charlotte Pass, 1994;

latte: 65° ; radiator: $90-105^{\circ}$;

baby bath: $37-38^{\circ}$; shop fridge: $1-4^{\circ}$

adult temp: about 37° ; applied;

fever: 38° +; applied

2. //applied investigation

Section 4: What's The Time

4A Different times 81

// applied visual task

4B Telling the time 82

1. 6 o'clock; 12:15; 6.15;

9.40; 9 o'clock; 4 o'clock

4C 12 v 24 83

1. 15:30 = 3:30 PM, 13:45 = 1:45 PM, 21:30 = 9:30 PM, 23:15 = 11:15 PM,

06:00= 6:00 AM, 04:55= 4:55 AM, 09:30= 9:30 AM, 21:45= 9:45 PM,

18:00= 6:00 PM, 00:00= 12:00 AM (midnight), 12:00= 12:00 PM (noon), 24:00 =12:00 AM (midnight), same as 00:00

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4D You and time 85 //applied

4E Converting time 87

1. a. 60 minutes, b. 120 minutes c. 75 minutes d. 270 minutes
 e. 240 minutes f. 1,200 minutes g. 135 minutes h. 1,440 minutes
 i. 2 hours j. 3 hours k. 5.5 hours l. 8.25 hours
 m. 10 hours n. 16 hours o. 16.5 hours p. 15 minutes

2. a. 3 hours (180 minutes) b. 3 hours 45 minutes (225 minutes) c. 4 hours 15 minutes (255 minutes)
 d. 6 hours 15 minutes (375 minutes) e. 5 hours (300 minutes) f. 4 hours (240 minutes)
 g. 2 hours 30 minutes (150 minutes) h. 6 hours (360 minutes) i. 80% = 54.4 mins plus time-on about 12-15 mins = approx 67 - 70 min (1 hour 7 mins to 1 hr 10 min)

4F Duration 89

1. 12 to 12:10 = 10 mins; 12:00 to 12:45 = 45 mins; 12 to 12:30 (30 min) + extra time to 11:50 (11:20) = 11:50 // or 30 min + 11:50 = 12 hr 20 min depending on how the question is read and applied
 2. a. 5 hrs, 4.5 hrs, 10 hrs 30 min, 7 hrs 45 min

4G Elapsed time 91

1. a. 4 hours b. 3 hours 15 minutes c. 5 hours 15 minutes
 d. 13 hours 30 minutes e. 13 hours 30 minutes f. 18 hours 45 minutes
 2. For Mon-Fri, the total opening hours is 15 hours per day \times 5 days = 75 hours.
 For Sat, it's 14.5 hours. For Sun, it's 13 hours.
 Total weekly opening hours is $75 + 14.5 + 13 = 102.5$ hours.

For weekdays, the total opening hours is 8 hours per day \times 5 days = 40 hours. For Saturday, it's 7 hours.
 Total weekly opening hours is $40 + 7 = 47$ hours.

3. //applied discussion

4H My timetable 92 // applied investigative task

4I Timetables in action 93 //applied investigative task

4J Rosters in action 95

	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							

2. Edwina = $44 = 8+8+8+6+6+8$ Reg = $12 = 4+4+4$ Adut = $16 = 8+8$ Jo = $14 = 4+5+5$ Frankie = 6
 Total = 92 hours

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4K Timesheets in action 97

Employer:	applied						
Name:	applied				Work period:	May 1-7, 2022	
Employee number:	applied			Classification:	Retail Worker Level 1	Adult	
	Date	Start	Finish	Break	Hours Worked	Rate	Total
Monday	1-May	8:15	17:00	13:00 to 13:45	8	\$23.38	\$187.04
Tuesday	2-May	8:15	17:00	13:00 to 13:45	8	\$23.38	\$187.04
Wednesday	3-May	8:15	17:00	13:00 to 13:45	8	\$23.38	\$187.04
Thursday	4-May	8:15	17:00	13:00 to 13:45	8	\$23.38	\$187.04
Friday	5-May	8:15	17:00	13:00 to 13:45	8	\$23.38	\$187.04
Saturday							
Sunday							
Totals					40		\$935.20

Section 5: Relationships

5A Relationships 103 //applied

5B Proportions 105

- a. 0.7 70% b. 0.25 25% c. 0.6 60% d. 0.9 90%
- a. 0.5 = five tenths b. 0.25 = twenty-five hundredths c. 0.10 = ten hundredths d. 0.01 = one hundredth
- a. 75% = seventy-five percent b. 33% = thirty-three percent c. 10% = ten percent d. 2.9% = two point nine percent
- Approx: Yellow: 25%, Red: 33%, Blue: 11%, Green: 20%, Purple: 11%

5C Ratios 107

- a. 2:1 b. 4 to 3 c. $\frac{5}{3}$ d. 2.5:1
- a. 1:2 Fraction: $\frac{1}{2}$ Decimal: 0.50 Percentage: 50%
- b. 1:4 Fraction: $\frac{1}{4}$ Decimal: 0.250 Percentage: 25%
- c. 1:5 Fraction: $\frac{1}{5}$ Decimal: 0.20 Percentage: 20%
- d. 7:8 Fraction: $\frac{7}{8}$ Decimal: 0.875 Percentage: 87.5%
- e. 2:1 Fraction: $\frac{2}{1}$ Decimal: 2.0 Percentage: 200%
- f. 4:1 Fraction: $\frac{4}{1}$ Decimal: 4.0 Percentage: 400%
- g. 16:9 Fraction: $\frac{16}{9}$ Decimal: ≈ 1.78 Percentage: $\approx 177.78\%$
- h. 4:3 Fraction: $\frac{4}{3}$ Decimal: ≈ 1.33 Percentage: $\approx 133.33\%$

3. //applied investigation

5D Rates 109

- a. kilometres & hours: speed b. litres & kilometres: fuel consumption c. litres & minutes: water use in shower d. dollars & hours: wage rate
- a. Fast jogger b. car at speed limit c. jet plane d. echidna
- 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.

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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. 60 km/h c. 800 km/h

d. \$20 per hour e. \$100 per day f. \$1,000 per week

g. 15 litres per 100 km h. 10 litres per 100 km i. 8 litres per 100 km

5E Working the numbers 111

a. For 6: 750g pasta, 6 eggs, 750ml milk, 750g cheese, 375ml cream, 3 onions, and 4.5 garlic cloves.

b. Fuel consumption is approximately 28.6 litres per 100 km, and it would cost \$140 to fill the tank at \$2.00 per litre. Stav gets 3.5 km/litre.

c. A 45-minute trip at an average speed of 30 km/h, the distance is approximately 22.5 km.

5F Common formulae 113

➤ Simple Interest Rate

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

➤ GST to Add to a Price

Original Price \times 10%

➤ GST Already in a Price

Total Price / 11

➤ Male Shoe Size Based on Foot Length

Shoe Size (US) = (3 \times Foot Length in inches) – 24.

➤ Female Shoe Size Based on Foot Length

Shoe Size (US) = (3 \times Foot Length in inches) – 22.5.

➤ Fuel Economy of a Vehicle

Fuel Economy = $\frac{\text{Fuel Consumed}}{\text{Distance Driven}} \times 100$.

➤ BMI - Normal Person

BMI = $\frac{\text{Weight in kg}}{\text{Height in meters}^2}$

➤ 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 \approx 5 human years.

➤ Unemployment Rate

Unemployment Rate = $\frac{\text{Total Unemployed}}{\text{Labour Force}} \times 100$

5G Relationship formulae 115

1. i. $2+4=6$ ii. $4+12=16$ iii. $30+72+100=202$ iv. $100+80-125=55$

2. a. $3E + 1F + 1stb + 0.3M = \text{recipe}$

b. $4B + 1W = \text{mix}$

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

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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. $4S + 2B + 1ST = L$; then $L \times 20 = \text{structure}$ //or $80S + 40B + 20ST = \text{structure}$

4. a. 60km/hr b. 90km/hr

5H Visual change 117

//applied visual and graphing activity

5I Visualisations 118-119

//applied investigation