

Answers

Green



1. "Guess & revise" or create a Venn diagram
Answer
5 adult Labradors
3 puppy Labradors
6 puppy Jack Russells
2. Takes 10th cyclist
 $30 - (9 \times 1) = 21$ mins
Departs 12:18pm
Finish \Rightarrow 12:39pm
3. p.1 \rightarrow 9 = 9 digits
p.10 \rightarrow 19 = 20 digits
p.20 \rightarrow 99 = 160 digits
p.100 \rightarrow 109 = 30 digits
p.110 \rightarrow 124 = 45 digits
 \Rightarrow 264 digits in 124 pages
4. 9 knots \times 1.85 = $16\frac{2}{3}$ km/h
 $18\text{h} \times 16\frac{2}{3}$ km/h = 300 km
 $300\text{km} \times 2 = 600\text{km}$
 $600\text{km} \div (18 + 2)$ hours
= 30km/h
5. Rufus
 $1000\text{ml} \div 10 = 100\text{ml}/\text{min}$
8 min \Rightarrow 800ml
Claude
8 min \Rightarrow 200ml
 $200 \times 5 = 1000\text{ml}$
8 min \times 5 = 40 minutes
6. "Guess & revise" using a list or table
8 goats \times \$5 = \$40
16 sheep \times \$3 = \$48
24 chooks \times 50¢ = \$12

Other solutions possible

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7. "Guess & revise" or algebra
Let y = original number
 $y/4 + 6 = y/3$
 $6 = y/3 - y/4$
 $6 \times 4 \times 3 = 4y - 3y$
 $72 = y$
 $(\frac{1}{4} \text{ of } 72) = 18$
 $18 + 6 = 24$
 $\frac{1}{3} \text{ of } 72 = 24$
Answer \Rightarrow 72
8. Fill 3L bucket \times 4 times
and put into 10L bucket
Keep 'unused' 2L
Empty 10L bucket
Pour 2L into 10L bucket
Fill 3L bucket & add it to
2L in 10L bucket
10L bucket will contain 5L
9. 6 (Yr4) + 18 (Yr 5) = 24
Therefore
 $24 = \frac{2}{3}$ of divers
 $\frac{1}{3} \Rightarrow 12$
Total divers = $24 + 12 = 36$

10.

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

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11. Lafayette feeds
30 chooks in 5 days
 \Rightarrow 1 day feeds $5 \times 30 = 150$
Increased flock
150 chooks \div 50 per day
 \Rightarrow 3 days

12. Christie 34
Melvin 14
Raoul 8
Peggy 4
 \Rightarrow 60 lollies originally

13. $\text{♂} = 3$
 $\text{♀} = 7$
 $\text{♂} = 9$

 $37 \times 9 = 333$

- 14a. "Guess & revise" or
Simultaneous equations
We know that
 $4x + y = \$15$
 $7x + y = \$24$
Therefore
 $4x + y + \$9 = 7x + y$
 $\Rightarrow \$9 = 3x$, so $x = \$3$
\$3 per tub

- b. Create a cost table / pattern
[9 packs \rightarrow \$162]

<u>4 pack</u>	<u>7 pack</u>	<u>\$ Total</u>
1	8	\$207
2	7	\$198

- Answer
 $6 \times 4 \text{ pk} = 6 \times \$15 = \$90$
 $3 \times 7 \text{ pk} = 3 \times \$24 = \$72$

15. 12
19
14 17 20 15 16
13
18
Other solutions possible

16. First 26 minutes
2 min = 7.5 L
20 min = 75 L
 $20 + 2 + 2 + 2 \Rightarrow$
26 min = 97.5L
Assume for 1 minute
5L in & 1.25L out = 3.75L
 $2.5 \div 3.75 \times 60 \text{ sec}$
 \Rightarrow 40 seconds
Answer
26 minutes & 40 seconds

17. Starting with
2 hexagonal end points
6 paths each
4 square points
3 paths each
Total possible paths
 $(2 \times 6) + (4 \times 3) = 24$

18. 40 pages \Rightarrow
Part A = 4 pages
Part B = 12 pages
Part C = 24 pages
Part A
25% of 4 = 1pg in ads
Part B
33% of 12 = 4pg in ads
Part C
12.5% of 24 = 3pg in ad

Total = 8 pages in ads
8 out of 40 = 20%

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19.

÷	14	70	42	28
$\frac{1}{2}$	28	140	84	56
7	2	10	6	4
4	$3\frac{1}{2}$	$22\frac{1}{2}$	$10\frac{1}{2}$	7
2	7	35	21	14

20. $186 - 68 = 118$

$D = 8$

$E = 6$

$F = 1$

21. $\frac{1}{4} + \frac{1}{3} + \frac{1}{6} = \frac{3}{4}$ $\Rightarrow \frac{1}{4}$ left over = 60 girlsTotal is $4 \times 60 \Rightarrow$

240 passengers

22. $5\text{m} \times 4\text{m} = 20\text{m}^2 @ \100

$10\text{m} \times 8\text{m} = 80\text{m}^2$

$\Rightarrow 4 \times \$100 = \400

23a. $7 \times 3 + 2 = 23$

b. $4 + (8 \times 5) = 44$

c. $(20 \div 4) - 3 = 2$

d. $16 \div (10 - 8) = 8$

24. $\frac{1}{2} - \frac{1}{5} = \frac{5}{10} - \frac{2}{10} =$

$\frac{3}{10} \Rightarrow 3 \text{ hours}$

$\frac{1}{10} \Rightarrow 1 \text{ hour}$

Flight is 10 hours

Departed 2pm

Arrives 12 midnight

25. 10 groups

swb, sw, sb, sbg, sg, swg

wbg, wb, wg, bg

26. "Guess & revise"

$16 \times 10\text{¢} = \$1.60$

$12 \times 20\text{¢} = \$2.40$

$12 \times 50\text{¢} = \$6.00$

27. $525 \times 5 = 2625$

$X = 2$

$Y = 6$

$Z = 5$

28. Kilometres

$0 \rightarrow 9 = 45$

$10 \rightarrow 19 = 45 + 10$

$20 \rightarrow 29 = 45 + 20$

$\Rightarrow (45 \times 10) + (10 + 20 + \dots + 90)$

$= 450 + 450 = 900$

$900 + 1 [\text{for } 100] = 901$

29. 86×10^6 people \div 90 year

\div 365 days \div 24 hours =

109 people each hour

30. Look for a pattern

1st line = 1cm

3rd line = 2 cm

5th line = $(5+1) \div 2 = 3\text{cm}$

Length \Rightarrow (Line no. + 1) \div 2

99th = $(99+1) \div 2 = 50\text{cm}$

Lengths combined make

$1+50, 2+49\dots$

$= 51\text{cm}$

$\Rightarrow 50 \text{ pairs} \times 51\text{cm} =$

2550cm (or 25.5m)

31. $2^6 = 64$

$3^5 = 243$

$4^4 = 256$

$5^3 = 125$

$6^2 = 36$

$7^1 = 7$

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32. p.1 \rightarrow 9 = 9 digits
p.10 \rightarrow 19 = 20 digits
p.20 \rightarrow 99 = 160 digits
p.100 \rightarrow 109 = 30 digits
p.110 \rightarrow 199 = 270 digits
p.200 \rightarrow 299 = 300 digits
p.300 \rightarrow 369 = 210 digits
 \Rightarrow 999 digits in 369 pages
33. 38 sets of
‘two forward one back’
makes 114 hops
 $38 \times 5 = 190\text{cm}$
2 more = 116 hops & 200cm
34. $\frac{1}{2} - \frac{1}{3} = 7$ branches
 $y (\frac{1}{2} - \frac{1}{3}) = \frac{1}{6}$
 $\Rightarrow y / 6 = 7$
 $y = 6 \times 7 = 42$
 $42 + 1$ [sitting] = 43 branches
35. $c = 2\Pi r$
Earth's $c = 12,756 \times \Pi =$
40,074km
Daily travel = 365 – 180 rest
= 185 days travelling
 $40,074 \div 185 = 216.6\text{km / day}$
36. Arithmetic reasoning
 $X = 5$
 $Y = 125$
37. $282 - 153 - 83 = V$
 $V \Rightarrow 46$
 $153 - 83 - 46 = U$
 $U \Rightarrow 24$

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38. Speed ratio [down : return]
is 12 : 20 \rightarrow 3 : 5
Time ratio
 $320 \text{ mins [total]} \div 8 =$
40 mins
1knot = 1.85km/h
- To Manly
 $20\text{knots} \times 1.85\text{km} = 37\text{km/h}$
Time ‘3’ \rightarrow 120 mins [2 hrs]
 $37\text{km/h} \times 2 \text{ hours} = 74\text{km}$
- Return trip
 $12\text{knot} \times 1.85\text{km} = 22.2\text{km/h}$
Time ‘5’ \rightarrow 200 mins [$3\frac{1}{3}$ hr]
 $22.2\text{km} \times 3\frac{1}{3} \text{ hours} = 74\text{km}$
- Total distance
 $74\text{km} \times 2 = 148\text{km}$
39. Rotations per minute
Large = 1
Middle = 5
Small = 15
Total rotations in 5 min =
 $5 \times (1+5+15) = 105$
40. Digits $1+2+\dots+9 = 45$
 $45 \div 9 = 5$ & $45 \div 3 = 15$
Divisibility rule for 9 & 3
- For example
 $867,541,392 \div 9 =$
96,393,488
 $293,145,786 \div 3 =$
97,715,262

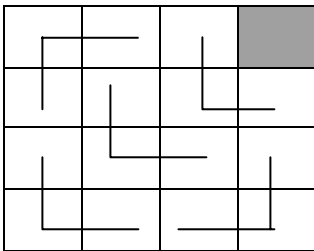
Answers

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$$\begin{array}{r} 41. \quad 3 \ 4 \ 2 \\ - \quad 1 \ 7 \ 8 \\ \hline \quad 1 \ 6 \ 4 \\ \\ \quad 6 \ 4 \ 8 \\ \quad 2 \ 7 \ 9 \\ - \quad 2 \ 2 \ 1 \\ \hline \quad 1 \ 4 \ 8 \end{array}$$

42.



43. Present
72 Girls & 48 Boys
Danced
40G & 20B
Other
12G & 18B
Watched
20G & 10B

44. Ratio
1 mile = 1.6 km
1 mile² = 2.56 km²
⇒ 905,328 x 2.56 =
2,317,640 km²

45. 1knot = 1.85km/h
250 = 100 sail & 150 ride
Douglas [20 knots = 37km/h]
100 ÷ 37 km/h = 2 hr 42
David
150 ÷ 50 = 3 hours
⇒ Douglas by 18 mins

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46. Venn diagram groupings
Apples & bananas = 10
Apples = 11
Apples, oranges and
bananas = 12
Oranges = 13
Bananas = 14
47. $1\frac{1}{4} + 5 = 6\frac{1}{4}$
 $1\frac{1}{4} \times 5 = 6\frac{1}{4}$
48. When x = consecutive odd
numbers, starting with 1
(x² - 2x) is the rule
⇒ 11² - 22 = 99
⇒ 13² - 26 = 143
49. Rule to find bottom number
(top number)² + 4 = 5
Work in reverse
 $\sqrt{(85 - 4)} = 9$
Follow rule
 $5^2 + 4 = 29$
Work in reverse
 $\sqrt{(68 - 4)} = 8$
50. Jaya
60L ÷ 60 min = 1L/min
Steve
60L ÷ 30 min = 2L/min
Together work at 3L/min
60L ÷ 3L/min ⇒ 20 mins
51. Top row = 1
2nd top = 3 (2 each side)
Continue pattern
(pyramid numbers)
1 + 3 + 6 + 10 + 15 +
21 + 28 = 84
⇒ 84 tins of peaches

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- 52a. $(1 + 2 + 3 \times 4) \div 5 = 3$
b. $3 \times 4 \times 5 \div 6 + 7 = 17$
c. $(5 \times 6) - 7 + (8 \times 9) = 95$

53. $210 \times 6 = 1260$
A = 2
B = 1
C = 0
D = 6

54. single squares 25
x4 squares 16
x9 squares 9
x16 squares 4
x25 squares 1
Total squares 55

- 55a. $x / 4 = 117$
 $\Rightarrow x = 468$ coins
 $468 \div 3 = 156$ stamps
 $\Rightarrow (468 + 156) \times 3 =$
1,872 matchboxes
Total = 2,496 items

- b. $2496 \div 12 = 208$ minutes
= 3 hrs + 28 minutes
 $\Rightarrow 2:28\text{pm}$

56. $x =$ total number of children
 $x(\frac{1}{2} - \frac{1}{3}) = x/6 = 9$
Total = $9 \times 6 \Rightarrow 54$ children
Line Tiggy = 18
Jets & Fighters = 27
40-40 home = 9

57. 15 moves

The easiest way to help solve this problem is to use four different sized coins.

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58. $27 \times 5 = 135$ runs in total
 $135 - 17 - 35 - 24 = 59$

Possible combinations

0+59, 1+58, 2+57, 3+56,
4+55, 5+54, 6+53, 7+52,
8+51, and then in reverse
 $\Rightarrow 18$ combinations

59. Find and continue pattern
A = $1 \times 2 \times 3 = 6$
B = $2 \times 3 \times 4 = 24$

Answer

$$F = 6 \times 7 \times 8 = 336$$

$$G = 7 \times 8 \times 9 = 504$$

60. Create a table, for example

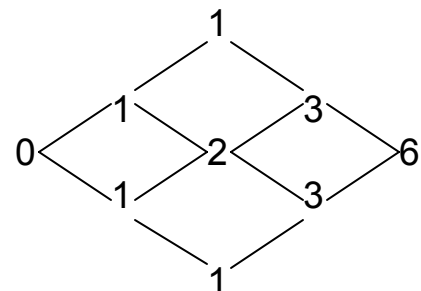
No.	Pos 1	Pos 2
1	1	
2	1 + 1	2
3	1 + 2	
4	x4 1's	x2 2's

Answer

5 coins are needed

1, 2, 4, 8, 16

61. Addition of pathways



Combined total = 6

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62. $\frac{1}{7}$ of 84 = 12
 $\frac{1}{8}$ of 84 = 14

63. Create a table

Page	Rule	Fits
34	$3 \times 4 = 12$	No
35	$3 \times 5 = 15$	Yes
36	$3 \times 6 = 18$	Yes

Answer

63 pages fit the rule

63 of $150 = 42\%$

$\Rightarrow 8\%$ off

64. $8750 \text{ m}^2 \div 7 = 1250 \text{ m}^2$
 Paddock 1
 Area = $4 \times 1250 = 5000 \text{ m}^2$
 $50 \text{ m} \times 100 \text{ m}$
 Paddock 2
 Area = $3 \times 1250 = 3750 \text{ m}^2$
 $50 \text{ m} \times 75 \text{ m}$

65. 149.6 million km \div
 $99,000 \text{ km} = 1512$ 'humans'

66. "Guess & revise"
 a. $27 \times 28 \times 29 = 21,924$
 b. $11 \times 12 \times 13 \times 14 = 24,024$

67. Time/distance table
 1 second
 D 8m B 5m
 10 seconds
 D 80m B 50m
 100 seconds
 D 800m B 500m

Answer

$133\frac{1}{3}$ seconds

D $1066\frac{2}{3} \text{ m}$ B $666\frac{2}{3} \text{ m}$

Both at 'same' place on track

$\Rightarrow 2 \text{ min} \ \& \ 13\frac{1}{3} \text{ sec}$

68. Total
 $\$37 \times 5 = \185
 Zane \$45
 Zebe \$50
 Inez \$30
 Zenya \$35
 Alexa \$25

69. single triangles 32
 x4 triangles 18
 x9 triangles 8
 x16 triangles 2
 Total triangles 60

70. Make a table testing speeds
 [min \rightarrow km] [27 \rightarrow 17]

Bike	Bus	Total
$5 \rightarrow 1\frac{2}{3}$	$22 \rightarrow 22$	$23\frac{2}{3}$
$10 \rightarrow 3\frac{1}{3}$	$17 \rightarrow 17$	$20\frac{1}{3}$
$15 \rightarrow 5$	$12 \rightarrow 12$	17

Answer

Bike for 15mins = 5km

Bus for 12mins = 12km

71. Create a table

	A	B	C	D	E	F	G
G1	22	24	26	28	30	32	34
G2	11	12	13	14	15	16	17
G3	36	36	36	36	36	36	36
G4	34	32	30	28	26	24	22
G5	17	16	15	14	13	12	11

There 7 different solutions to this challenge.

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72.

(9	+	5)	x	2	=	28
+		x		x		
4	x	6	÷	3	=	8
+		+		-		
7	x	8	+	1	=	57
=		=		=		
20		38		5		

73. "Guess & revise"
Make a costs table

Answer

Glass bottles

$$12¢ \times 190 = \$22.80$$

Plastic bottles

$$7¢ \times 60 = \$4.20$$

74. Work in reverse
Cat 10% of 1L = 100ml
Jackson

$$100\text{ml} + 50\text{ml} = 150\text{ml}$$

Marg 100ml + 50ml = 150ml

$$\Rightarrow 600\text{ml left}$$

Will 350ml

Amy 250ml

75. $\text{⌘} = 2^5 \div 2 = 16$

$$\text{⌘} = 3^4 \div 9 = 9$$

$$\text{⌘} = 5^3 \div 50 = 2\frac{1}{2}$$

76. 200g with 100g pure

Add 200g pure gold

$$\Rightarrow 400\text{g with } 300\text{g pure}$$

which is 18 carats

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77. John in Australia [10% GST]
 $\$400 \times (100/110) =$
 $\$363.64$
 $\Rightarrow \text{GST} = \36.36

Helen in NZ [12.5% GST]
 $\$400 \times [100/112.5] =$
 $\$355.56$
 $\Rightarrow \text{GST} = \44.44

If students don't know how to calculate GST, then they'll need to set up a trial table.

78. $150\text{kg} \times 0.02 = 3\text{kg}$ 'pure'
 $3\text{kg} \times 0.1 = 300\text{g}$ 'gem'
 $5\text{g} \rightarrow \$15,000$
 [multiply by a factor of 3,000]

Answer

$$60\text{g} \rightarrow \$900,000$$

79. "Guess & revise"
Wheels
 $\frac{1}{4}$ of \$100 \rightarrow \$75
Gears
 10% of \$300 \rightarrow \$270
Frame
 20% of \$600 \rightarrow \$480

80. Yoshi fills 5L per minute
Ichi fills 4L per minute
Mitsuko fills $2\frac{1}{2}$ L per minute
Combined = $11\frac{1}{2}$ L/min

$$100\text{L} \div 11\frac{1}{2} = 8.7 \text{ minutes}$$

Answer

8 minutes & 42 seconds

Answers

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Maths Challenge Cards

E81. Process of elimination
Crystal 51 & Judy 68

E82. Establish a distance table,
siphoning fuel from F's 1→11

F.	Fraction of 500km	Total km's
1	1/12 = 41.67	41.67
2	1/11 = 45.45	87.12
3	1/10 = 50	137.12
4	1/9 = 55.56	192.68
5	1/8 = 62.5	255.18
6	1/7 = 71.43	326.61
7	1/6 = 83.33	409.94
8	1/5 = 100	509.94
9	1/4 = 125	634.94
10	1/3 = 166.67	801.61
11	1/2 = 250	1051.61
12	1/1 = 500	1551.61

Answer 1,551,61km max.

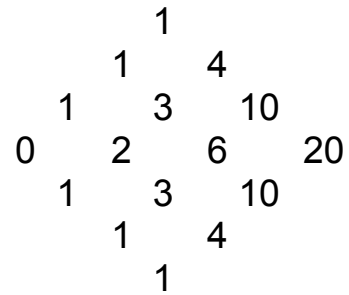
- E83. = 1
 = 2
 = 7
 = 8

E84. Set-up a 'points' table

3pts	5pts	7pts	Total
0	11	0	55
1	9	1	55
2	7	2	55
3	5	3	55
4	3	4	55
5	1	5	55

Answer 6 rounds

E85. Addition of pathways



Combined total is 20

E86. Set-up a table

Day	Extra milligrams
1	200 x 0.4 = 80 mg
2	(200+80) x 0.4 = 112
3	(200+112) x 0.4 = 124.8
4	324.8 x 0.4 = 129.92
5	329.92 x 0.4 = 131.97
6	331.97 x 0.4 = 132.79
7	332.79 x 0.4 = 133.11
8	333.11 x 0.4 = 133.25
9	333.25 x 0.4 = 133.30
10	333.30 x 0.4 = 133.32

Answer 133.32mg heavier

E87. \$1000 ÷ \$2 = 500km

Park's radius = 1km

C = 2Πr = 6.28km

500 ÷ 6.28 = 79.62 laps

Day	Laps	Total laps
1	20	20
2	19	39
3	17	56
4	14	70
5	10	80
		<u>ANSWER</u>



E88. Set-up a table

Hour	Drink	Total
9am	$100 - 100 \div 4$	75ml
10	$75 - 75 \div 4$	56.25
11	14.06	42.19
12	10.55	31.64
1pm	7.91	23.73
2	5.93	17.80
3	4.45	13.35
4	3.34	10.01
5pm	2.5	7.51

Answer Closest hour is 5pm

E89. Uses the formulae

Circumference = $2\pi r$

Area = πr^2

Volume of cylinder = $\pi r^2 \times h$

Inside ring

$C = 2\pi r = 50\text{mm}$

Therefore radius is

$50 \div 2\pi = 7.95\text{mm}$

Area = $\pi r^2 \Rightarrow 198.86\text{mm}^2$

$V = A \times 5\text{ml} = 994.32\text{mm}^3$

Outside ring

$R = 7.95 + 1 = 8.95\text{mm}$

Area = $\pi R^2 \Rightarrow 251.75\text{mm}^2$

$V = A \times h = 1258.75\text{mm}^3$

Difference = $V1 - V2$

$\Rightarrow 264.43\text{mm}^3$

E90. 1kg = 2.2 lb

1in = 2.54cm

10cm x 10cm x 10cm of
water weighs 1kg

Ball radius

Diameter = 8.6 inches

Therefore

$(8.6 \div 2) \times 2.54 =$

10.92cm

Ball volume [sphere]

$\frac{4}{3} \times \pi r^3 = \frac{4}{3} \times 4092.54$

$\Rightarrow 5456.72\text{cm}^3$

1000cm³ = 1kg

Covert to pounds

$(5456.72 \div 1000) \times 2.2$

$\Rightarrow 12.00\text{ pounds}$

Answer 12 pound bowling ballChallenges 91 → 100

These are open-ended questions, with no set solutions. Please refer to introductory sheet 3 for a thorough explanation.