

Grade 7 Mathematics Workbook

Manitoba Edition • Answer Key

For teachers and parents

Answers follow the order of the workbook: Ready Check, units, Diagnostic Checkpoints and the Grade 7 Cumulative Check. Equivalent forms are accepted unless a form is required.

Scoring conventions

- Equivalent forms are accepted unless a prompt explicitly requires a form (for example, percent, ratio, simplest fraction, or bar notation).
- Circle calculations use pi approximately 3.14 and round to the nearest tenth unless the question says otherwise.
- Construction tasks: accept about +/-2 mm for measured lengths and about +/-2 degrees for protractor boundaries, with teacher judgment for pencil/line thickness.
- Graphs/constructions must include the labels, title, centre, legend or other features explicitly required by the prompt.
- Open reasoning items are scored by mathematical evidence, not exact wording. A different valid method receives credit.
- Experimental probability results vary. Score the recording total, calculation from the student data, comparison with theory, and reasoning rather than a single fixed experimental percentage.

Part 1 - Number

Ready Check

Item	Answer / scoring note
1	56
2	26
3	0.07 (7 hundredths)
4	8
5	$\frac{5}{8}$
6	6, 12, 18, 24

Unit 1 - Divisibility and Factors

Try It

Item	Answer / scoring note
1	Digit sum 18; divisible by 3: yes; therefore 738 is divisible by 6.
2	3; 2; prime factorization $60 = 2 \times 2 \times 3 \times 5 = 2^2 \times 3 \times 5$.
3	Missing factors 10 and 15; common factors 1, 2, 3, 6; GCF = 6.
4	36, 48; LCM = 36.

Develop

Item	Answer / scoring note
1	135 and 990.
2	Any 3-digit number ending in 0, e.g. 120; last digit must be 0.
3	8316: divisible by 3 and by 9; digit sum = 18.
4	No; digit sum 12 is not divisible by 9.
5	Yes; last three digits 128 are divisible by 8.
6	Divisible by 4: yes (40); divisible by 8: no (340 is not divisible by 8).
7	252 and 1116.
8	Undefined: there is no number q for which $0 \times q = 9$.
9	1×48 , 2×24 , 3×16 , 4×12 , 6×8 .
10	7, 14, 21, 28, 35.
11	12 is a multiple of 4 and a factor of 36.
12	Prime: 2, 17, 29. Composite: 9, 21. Neither: 0, 1.
13	No. $91 = 7 \times 13$, so it is composite.
14	$84 = 2^2 \times 3 \times 7$.
15	$150 = 2 \times 3 \times 5^2$.
16	14
17	15
18	30
19	36

Apply and Reason

Item	Answer / scoring note
1	GCF = 12 kits; 3 pencils and 4 erasers per kit.
2	LCM = 24 km.
3	60 minutes after 8:00, so 9:00.
4	Largest square side = 8 cm; 15 squares.
5	40 hot dogs and 40 buns: 4 hot-dog packs and 5 bun packs.
6	2, 3, 6 and 9 all divide the number.
7	0, 3, 6, 9.
8	18 in.

Recalculate

Item	Answer / scoring note
1	Jordan is wrong. Use the last two digits: 16 is divisible by 4, so 316 is divisible by 4.
2	1312: yes. 1342: no.
3	$\text{LCM}(4,10)=20$, not 40.
4	$\text{LCM}(6,9)=18$; 54 is a common multiple but not the least.
5	No. 1 has only one positive factor, so it is neither prime nor composite.
6	2, 3, 5, 7; four primes.
7	$\frac{15}{0}$ is undefined; no number multiplied by 0 equals 15.
8	$\frac{0}{8} = 0$ has an answer; $\frac{8}{0}$ is undefined.
9	3 is a factor of 12; 12 is a multiple of 3.
10	45 is a multiple of 9; 9 is a factor of 45.
11	Student B; 6 cm, the GCF.
12	72 seconds, the LCM of 18 and 24.

Unit 2 - Decimals

Try It

Item	Answer / scoring note
1	7.85
2	322; 3.22
3	18
4	Next digit 6; round up; 3.5

Develop

Item	Answer / scoring note
1	Six and two hundred seven thousandths.
2	0.03 (3 hundredths).
3	0.7; $0.70 > 0.07$.
4	$2.03 < 2.3 < 2.303 < 2.33$.
5	15.65
6	1.0 (or 1).
7	6.07
8	6.15
9	5.19
10	360; 0.0452
11	0.8
12	0.06
13	21
14	4
15	3.2
16	5
17	40
18	Reasonable estimate about 60; exact 61.38.

Apply and Reason

Item	Answer / scoring note
1	\$1.96 change.
2	\$8.50
3	18 cups.
4	5 bags.
5	25; exact product is 24.96.
6	12.09, 12.1, 12.19, 12.9 seconds.

Recalculate

Item	Answer / scoring note
1	Decimal placement is unreasonable; $4.8 \times 0.6 = 2.88$.
2	Estimate about 2; exact 2.24.
3	No. $0.45 < 0.50$.
4	$0.3 > 0.299$.
5	Line up decimal points; 7.25.
6	13.04.
7	Dividing by 0.5 asks how many halves fit; answer 12.
8	Greater; 32.

9	Multiplying by 0.4 takes part of 20; answer 8.
10	Less; 3.15.

Mixed Review

Item	Answer / scoring note
1	8.78
2	16
3	0.24
4	Yes; digit sum = 18.
5	6
6	24
7	$1.05 < 1.5 < 1.505 < 1.55$.
8	$72 = 2^3 \times 3^2$.

Unit 3 - Fractions

Try It

Item	Answer / scoring note
1	GCF 6; 3; 4; $\frac{3}{4}$.
2	$\frac{10}{12}$ and $\frac{3}{12}$; difference $\frac{7}{12}$.
3	3 R 2; $3\frac{2}{5}$.

Develop

Item	Answer / scoring note
1	Any two equivalents, e.g. $\frac{4}{10}$ and $\frac{6}{15}$.
2	$\frac{3}{4}$.
3	$\frac{15}{4}$.
4	$4\frac{5}{6}$.
5	$\frac{5}{8}$.
6	$\frac{3}{5} < \frac{2}{3} < \frac{7}{10}$.
7	Less than $\frac{1}{2}$.
8	$\frac{5}{8}$.
9	$\frac{11}{15}$; the work must also show a matching fraction-bar model.
10	$\frac{1}{5}$.
11	$3\frac{5}{6}$.
12	$2\frac{1}{2}$.
13	$2\frac{1}{3}$.

Apply and Reason

Item	Answer / scoring note
1	Both ingredients total $1\frac{5}{12}$ cups, so they fit in a 2-cup container; $\frac{7}{12}$ cup of space remains.
2	$1\frac{3}{4}$ m.
3	$\frac{9}{10}$ is closer to 1 (distance $\frac{1}{10}$ versus $\frac{1}{8}$).

Recalculate

Item	Answer / scoring note
1	$\frac{2}{5}$ is even less than $\frac{1}{2}$, so it cannot be the sum; correct sum $\frac{5}{6}$.
2	$\frac{13}{24}$.
3	No; with equal numerators, fifths are larger than eighths, so $\frac{3}{5} > \frac{3}{8}$.
4	$\frac{4}{7}$.
5	Regroup one whole before subtracting; answer $2\frac{2}{3}$.
6	$2\frac{1}{2}$.

Mixed Review

Item	Answer / scoring note
1	$\frac{7}{10}$
2	1
3	$\frac{2}{3}$
4	30
5	6
6	Yes; 136 is divisible by 8.

Extension - Multiply / Divide

Item	Answer / scoring note
Try 1	$\frac{2}{3} \times \frac{9}{4} = \frac{3}{2} = 1\frac{1}{2}$.
2	6
3	$\frac{1}{6}$
4	4
5	15
6	$3\frac{1}{2}$
7	$1\frac{1}{2}$
8	24 students
9	8 bottles
10	$\frac{1}{3}$
11	$\frac{1}{4}$
12	5
13	$6\frac{1}{4}$

14	$5\frac{1}{4}$
15	Flip the divisor, not the dividend; $\frac{3}{4} \div \frac{1}{2} = \frac{3}{2} = 1\frac{1}{2}$.
16	4; more than 1.

Unit 4 - Fractions, Decimals and Percents

Try It

Item	Answer / scoring note
1	5; 0.625.
2	GCF 4; $\frac{9}{25}$.
3	$\frac{15}{100}$; 15%.
4	0.666... with a bar over 6; 0.67.

Develop

Item	Answer / scoring note
1	0.7
2	0.75
3	0.45
4	0.875
5	0.555... (bar over 5).
6	0.1666... (bar over the repeating 6).
7	$\frac{4}{5}$
8	$\frac{1}{8}$
9	$\frac{3}{50}$
10	62%
11	7%
12	0.04
13	60%
14	$\frac{17}{20}$
15	0.125
16	$\frac{2}{3}$ is greater than 0.6.
17	$0.7 < 72\% < \frac{3}{4}$.
18	$0.18 < \frac{1}{5} < 21\%$.

Apply and Reason

Item	Answer / scoring note
1	Ana: $\frac{17}{20} = 85\%$, Ben = 82%, Cai = 84%.
2	75% taken; 25% empty.
3	No. 0.6666667 is a rounded display of the repeating decimal 0.666....
4	Store A: 30% is greater than 28% and 25%.
5	$\frac{7}{20}$ and 35%.
6	0.375 km = 375 m.

Recalculate

Item	Answer / scoring note
1	$\frac{1}{4} = 0.25$.
2	0.6.
3	$0.3 \times 3 = 0.9$, so 0.3 is not exact; $\frac{1}{3} = 0.333\ldots$ repeating.
4	0.444... repeating.
5	$0.07 = 7\%$.
6	$0.5 = 50\%$; $0.5\% = 0.005$.
7	No; $35\% = 0.35 < 0.4$.
8	$0.1 = 10\%$, so 0.1 is greater than 9%.

Mixed Review

Item	Answer / scoring note
1	0.4
2	$\frac{4}{5}$
3	90%
4	0.6
5	$\frac{1}{2} < 52\% < 0.55$.
6	9
7	$\frac{3}{4}$
8	$\frac{5}{6}$.

Unit 5 - Integers

Try It

Item	Answer / scoring note
1	3; answer 3.
2	-6; -10.
3	8; 11.
4	-3 and -2.

Develop

Item	Answer / scoring note
1	-3 is greater.
2	-6, -1, 0, 2, 4.
3	-1.2, -1.05, -0.8.
4	$-\frac{3}{4}$ is less.
5	9; -4.5.
6	3
7	-5
8	-11
9	0
10	-4

11	-5; the work must also show a number-line model.
12	-9
13	7
14	-3
15	8
16	9

Apply and Reason

Item	Answer / scoring note
1	13 C
2	-5 m
3	\$15
4	15 C
5	Noon: -3 F. Evening: -10 F. Evening is 7 F colder than noon.
6	Positive; 52 has greater magnitude than 47, so the sum is 5.

Recalculate

Item	Answer / scoring note
1	No; -3 is greater than -8.
2	-0.45.
3	The multiplication sign rule does not apply to addition; answer - 10.
4	-15
5	Subtracting a negative means adding the opposite; -4.
6	3
7	Subtraction may go below zero; -3.
8	-7

Mixed Review

Item	Answer / scoring note
1	-5
2	35%
3	10
4	$\frac{1}{2}$
5	-2.5, -2, 0, 1.5.
6	15
7	-9
8	36

Extension - Multiply / Divide

Item	Answer / scoring note
Try 1	-4; -4.
2	-24
3	35
4	4
5	-7
6	-24
7	-15 C

8	Same signs give a positive product; 20.
9	$(-6)(-2)=12$; $(-6)(2)=-12$.

Unit 6 - Order of Operations

Try It

Item	Answer / scoring note
1	18; 22.
2	10; 10; 5; 6.
3	6; 8.5.

Develop

Item	Answer / scoring note
1	6
2	10
3	3
4	8
5	9
6	14
7	15
8	13
9	5.2
10	7.5
11	8
12	18
13	$(6 + 4) \times 2 = 20$.

Apply and Reason

Item	Answer / scoring note
1	$4 \times 8 + 5 \times 3 = \$47$.
2	$(24 + 6) / 3 = \$10$ each.
3	7; division before addition.
4	$36 / (6 - 2) \times 3 = 27$.
5	$5 - 3(1.2) = 1.4$ m.

Recalculate

Item	Answer / scoring note
1	Multiplication and division have equal priority, left to right; answer 8.
2	12.
3	Addition and subtraction have equal priority, left to right; answer 9.
4	13.
5	Do multiplication before addition; answer 14.
6	17.

Mixed Review

Item	Answer / scoring note
1	13

2	-3
3	9
4	0.225
5	11
6	$\frac{11}{20}$
7	9
8	$0 \div 6 = 0$ is defined. $6 \div 0$ is undefined because no number multiplied by 0 equals 6.

Extension - Powers / Roots

Item	Answer / scoring note
Try 1	81
Try 2	9; 9; 18; 20.
3	$5^3 = 125$.
4	64
5	1000; 3 zeros.
6	13
7	25
8	10
9	1, 4, 9, 16, 25, 36, 49, 64, 81, 100.
10	9
11	12
12	Between 7 and 8 because $49 < 50 < 64$.
13	$(-2)^2 = 4$; $-2^2 = -4$.
14	8m
15	$3^4 = 81$ people.
16	$3^2 = 9$, not 6.
17	25
18	Do exponent first: $2 \times 9 = 18$.
19	32
20	$\sqrt{16} = 4$, not 8.
21	6
22	$-3^2 = -9$.
23	$-4^2 = -16$; $(-4)^2 = 16$.

Part 1 - Number

Diagnostic Checkpoint 1

Item	Answer / scoring note
1	$0.3 < 32\% < \frac{1}{3}$.
2	10
3	Yes; digit sum = 18, which is divisible by 9.
4	3
5	$1\frac{4}{5}$
6	0.625
7	0.48
8	8
9	$\frac{11}{12}$

10	8
11	$-2 < -1.5 < -0.5$.
12	5.96

Part 2 - Proportional Reasoning

Ready Check

Item	Answer / scoring note
1	$\frac{2}{3}$
2	27%
3	3
4	20
5	-3
6	24

Unit 7 - Ratios

Try It

Item	Answer / scoring note
1	GCF 6; 2; 3; 2:3.
2	Concentrate 6; water 10 and 20.
3	Girls:boys = 12:15 (or 4:5); girls:all = 12:27 (or 4:9).

Develop

Item	Answer / scoring note
1	Wins:losses 7:5; losses:wins 5:7; wins:games 7:12.
2	3:8 and $\frac{3}{8}$.
3	3:5
4	3:2
5	Yes; both simplify to 2:3.
6	28
7	35
8	12 red counters.
9	$\frac{2}{5}$.

Apply and Reason

Item	Answer / scoring note
1	35 km.
2	6 L blue and 15 L yellow; tape diagram should show 7 equal parts.
3	Class A; $\frac{3}{5} = 60\%$, while Class B is $\frac{3}{7} \approx 42.9\%$.

Recalculate

Item	Answer / scoring note
1	Scale by multiplying both terms by 3; 9 cups milk.
2	12:15.
3	Part-to-whole is $2/(2+3) = \frac{2}{5}$.
4	$\frac{1}{5}$.

Mixed Review

Item	Answer / scoring note
1	2:3
2	26
3	-12
4	36
5	55%
6	$\frac{3}{8} < \frac{1}{2} < \frac{5}{6}$.
7	30

Unit 8 - Percent

Try It

Item	Answer / scoring note
1	4; 12.
2	25; 25; 75.
3	$\frac{30}{100}$; 30%.
4	4; 60.

Develop

Item	Answer / scoring note
1	35
2	6
3	43
4	30
5	9
6	48
7	36
8	6
9	45%
10	25%
11	20%
12	36
13	60
14	30
15	A reasonable estimate is about 10; exact value is 9.88.

Apply and Reason

Item	Answer / scoring note
1	168 students.
2	60%.
3	60 students.
4	1300 mL.
5	Test B: $\frac{42}{50} = 84\%$; $\frac{34}{40} = 85\%$.
6	3 lb.

Recalculate

Item	Answer / scoring note
1	20% of 60 is 12.
2	27
3	10% of 350 is 35.
4	4.8
5	30 is 40% of 75; whole = 75.
6	50
7	Use the whole 24: $\frac{18}{24}$ passed = 75%, so 25% failed.
8	$\frac{30}{40} = 75\%$ do not walk.

Mixed Review

Item	Answer / scoring note
1	32
2	20
3	24%
4	24
5	80
6	-6
7	0.222... with bar over 2.
8	0.028

Unit 9 - Percent and Money

Try It

Item	Answer / scoring note
1	\$9 discount; \$36 sale price.
2	\$2 tax; \$27 total.

Develop

Item	Answer / scoring note
1	\$60
2	\$32.40
3	\$36 discount; \$84 sale price.
4	\$53
5	\$2.70 tip; \$20.70 total.
6	\$84.75
7	\$60

Apply and Reason

Item	Answer / scoring note
1	\$31.50
2	Store A; \$40 versus \$42, so \$2 cheaper.
3	\$9.60 tip: 10% = \$6.40 and 5% = \$3.20.

Recalculate

Item	Answer / scoring note
1	\$9 is the discount, not the sale price; sale price \$51.
2	\$63.
3	\$3 is tax; total \$53.
4	Tax \$6; total \$126.
5	Tax applies to the \$80 sale price; tax \$4; total \$84.
6	\$49.50.
7	\$42 is 70% of original; original \$60.
8	\$90.

Mixed Review

Item	Answer / scoring note
1	\$27
2	12
3	$\frac{4}{9} = 0.444\ldots$ with a bar over 4.
4	\$21
5	13
6	30
7	-5
8	$\frac{5}{12}$

Unit 10 - Coordinate Plane

Try It

Item	Answer / scoring note
1	(-4, 1); Quadrant II.

Develop

Item	Answer / scoring note
1	A IV, B III, C II, D I.
2	(4, 0).
3	Plot A(2,3), B(-3,1), C(-2,-4), D(4,-2).
4	(4, -2).
5	(1, 4).

Apply and Reason

Item	Answer / scoring note
1	6 units.
2	D(-3, -3).
3	14 grid units.
4	Possible points: (7,-2), (-5,-2), (1,4), (1,-8); any two + explanation that there are two horizontal and two vertical choices.

Recalculate

Item	Answer / scoring note
1	x then y: move 3 right and 2 down.
2	5 left and 1 up.
3	(-2,5) is Quadrant II.
4	Quadrant IV.
5	Right/down signs were reversed; correct point (2,-2).
6	(-2,2).
7	Distance is positive separation of x-values: 8 units.
8	8 units.

Mixed Review

Item	Answer / scoring note
1	Quadrant III
2	7
3	\$56
4	3:5
5	3
6	-15
7	9
8	$5\frac{3}{4}$

Part 2 - Proportional Reasoning

Diagnostic Checkpoint 2

Item	Answer / scoring note
1	3:4
2	\$36
3	9
4	8 units
5	10 red marbles
6	70
7	Quadrant III
8	\$31.50

Part 3 - Algebra

Ready Check

Item	Answer / scoring note
1	25
2	5
3	5
4	8
5	14
6	Quadrant I

Unit 11 - Patterns and Relations

Try It

Item	Answer / scoring note
1	5; $5n$; 5; 1; rule $5n + 1$.
2	1, 4, 7, 10.
3	20; 43.

Develop

Item	Answer / scoring note
1	$5n$
2	$2n + 1$
3	$3n + 5$
4	$4n - 2$
5	$x:0,1,2,3 \rightarrow y:2,6,10,14$.
6	$x:1,2,3 \rightarrow y:2,7,12$.
7	61
8	47
9	Points (1,3),(2,5),(3,7),(4,9); straight increasing pattern.
10	No; number of chairs/tables is discrete.
11	Adds 5 each term; rule $5n + 2$.

Apply and Reason

Item	Answer / scoring note
1	Rule $3n + 1$; 76 toothpicks for 25 squares.
2	0-3 min: 500, 540, 580, 620; rule $A = 500 + 40t$.
3	Rule $4n + 2$; 50 people at 12 tables.
4	Temperature points should be joined; ticket counts are discrete and should not.
5	Weeks 0-4: 3,5,7,9,11 in; after 10 weeks 23 in.

Recalculate

Item	Answer / scoring note
1	Rule $4n + 1$.
2	$5n - 2$.
3	Rule $3n - 1$; 50th term 149.
4	Rule $4n + 6$; 30th term 126.

5	The student plotted (y,x); correct points (1,4),(2,6),(3,8).
6	(0,5),(1,8),(2,11).
7	Bike counts are discrete; do not join.
8	Yes; distance over time is treated as continuous between recorded times.

Mixed Review

Item	Answer / scoring note
1	$2n + 5$
2	Quadrant IV
3	21
4	19
5	-9
6	16
7	23
8	3.35

Unit 12 - Expressions

Try It

Item	Answer / scoring note
1	6; 24; 21.
2	$7x$; 7; $7x + 7$.
3	n ; 3; expression $2n + 3$.

Develop

Item	Answer / scoring note
1	Coefficient 6; variable y ; constant -9.
2	Expressions: $3x+1$, $7-k$. Equations: $2y=10$, $4+5=9$.
3	13
4	11
5	7
6	11.5
7	5
8	-3
9	$n-8$
10	$3x + 4$
11	$7x$
12	$7y + 5$
13	$5a + 10$
14	$4m + 5n$
15	No; unlike terms $3x$ and 4 cannot combine.

Apply and Reason

Item	Answer / scoring note
1	$20 + 0.10t$; for 150 texts, \$35.
2	21 cm.
3	$4x + 4$; at $x=5$, 24.
4	$L - 3$; at $L=10$, 7 ft.
5	Yes; addition is commutative. Example $n=1 \rightarrow 5$ both ways; $n=2 \rightarrow 7$ both ways.

Recalculate

Item	Answer / scoring note
1	Unlike terms cannot combine. At $x=2$, $3x+4=10$ while $7x=14$.
2	$6y + 2$.
3	$2x$ means multiplication, not digits; correct value 13.
4	11.
5	Different variables cannot combine; $3a + 3b$.
6	$5x + 5y$.
7	It is an expression, not an equation; do not solve for x .
8	Expression; it can be evaluated if k is given; it is already simplified.

Mixed Review

Item	Answer / scoring note
1	8
2	$4n + 5$
3	$3b - 8$
4	On the y -axis at $(0,-3)$.
5	\$63
6	8
7	$\frac{9}{10}$
8	0.45

Unit 13 - Equations

Model It

Item	Answer / scoring note
A	$x + 4 = -3 \rightarrow x = -7$; model must show the same change on both sides; substitution checks.
B	$3x + 6 = 18 \rightarrow$ subtract 6 from both sides, then divide by 3; $x = 4$; check $3(4)+6=18$.
C	Changing only one side destroys equality because the two sides no longer represent the same value.

Try It

Item	Answer / scoring note
1	7; $x=8$.
2	6; $x=7$.
3	3; 14; 2; $x=7$.
4	18; yes.

Develop

Item	Answer / scoring note
1	$x=13$
2	$x=-7$
3	$x=7$
4	$n=30$
5	$y=4.5$
6	$x=6$
7	$x=7$

8	$x=0$
9	$x=21$
10	$n=6$
11	No; $4(3)+5=17$, not 19.
12	Adding 4 to both sides.
13	$x=3$

Apply and Reason

Item	Answer / scoring note
1	$4 + 2k = 18$; $k=7$ km.
2	$15 + 5w = 60$; $w=9$ weeks.
3	$4x + 2 = 20$; $x=4.5$ ft.
4	$2(9+w)=30$; $w=6$ cm.
5	No; $3(8)+4=28$, not 25.

Recalculate

Item	Answer / scoring note
1	Subtract 5; $x=5$.
2	$x=6$.
3	Subtract 6 from both sides; $x=4$.
4	$x=-5$.
5	Divide by 4; $x=5$.
6	$x=9$.
7	$x=20$.
8	$x=9$ gives 13, not 11; correct $x=8$.

Mixed Review

Item	Answer / scoring note
1	13
2	$3n - 5$
3	5
4	79
5	30
6	12
7	4
8	12

Part 3 - Algebra

Diagnostic Checkpoint 3

Item	Answer / scoring note
1	$x=36$
2	$4m + 7$
3	88
4	$x=7$
5	$4n + 2$
6	13

Part 4 - Geometry and Measurement

Ready Check

Item	Answer / scoring note
1	28 cm^2
2	22 cm
3	Obtuse
4	70 degrees
5	31.4
6	4.5

Unit 14 - Transformations

Try It

Item	Answer / scoring note
1	(1,-2).
2	(2,5).
3	(-4,-1).

Develop

Item	Answer / scoring note
1	(6,4)
2	(-4,3)
3	5 left and 5 up.
4	(5,-2)
5	(3,-4)
6	(0,-6)
7	(-1,3)
8	(2,-4)
9	(5,-1)
10	Reflection in the y-axis.
11	180-degree rotation about the origin.
12	New vertices: (-1,-3), (1,-3), (1,-1), (-1,-1); drawing should be congruent to original.

Apply and Reason

Item	Answer / scoring note
1	Translation.
2	Points on the x-axis, where $y=0$.
3	5 right and 3 down.
4	Yes; translations preserve size and shape.
5	Result (-2,-3), the same as a 180-degree rotation of (2,3).

Recalculate

Item	Answer / scoring note
1	Reflecting in x-axis changes y; image (3,2).
2	(-5,-4).
3	Left subtracts from x; (-1,6).

4	(-4,-4).
5	That is clockwise; counterclockwise image is (-3,2).
6	(-1,4).
7	No; reflection preserves lengths.
8	5 units.

Mixed Review

Item	Answer / scoring note
1	(-1,-4)
2	x=6
3	(6,2)
4	4y + 1
5	21
6	-5
7	$\frac{3}{5} < \frac{5}{8} < \frac{2}{3}$.
8	12

Unit 15 - Constructions

Try It

Item	Answer / scoring note
1	5 cm; 90 degrees.
2	2; 62 degrees.
3	Obtuse.

Develop / Reasoning

Item	Answer / scoring note
1	35 acute; 90 right; 145 obtuse; 180 straight.
2	75-degree construction; accept within about +/-2 degrees.
3	130-degree construction; accept within about +/-2 degrees.
4	Perpendicular through A; 90-degree check required.
5	Parallel line through P; equal separation / corresponding-angle construction accepted.
6	Midpoint 4.5 cm from C; perpendicular bisector at 90 degrees.
7	Each half 50 degrees; bisector construction required.
8	7 cm; every point on a perpendicular bisector is equidistant from the segment endpoints.
9	The 90-degree pair.
10	43 degrees.

Apply and Reason

Item	Answer / scoring note
1	Anywhere on the perpendicular bisector of segment AB.
2	45 degrees.
3	Parallel rails stay the same distance apart and do not meet.
4	No; perpendicular is exactly 90 degrees. The shelf is 2 degrees off.

Recalculate

Item	Answer / scoring note
1	Wrong protractor scale; likely 50 degrees because the angle is acute.
2	145 degrees.
3	It passes through the midpoint but not at 90 degrees; not a perpendicular bisector.
4	No; for an 8 cm segment the midpoint is 4 cm from each end.
5	Each half is 40 degrees.
6	75 degrees.
7	Visual appearance is not enough; 87 degrees is not perpendicular.
8	Yes; page orientation does not matter, only 90 degrees.

Mixed Review

Item	Answer / scoring note
1	32 degrees
2	(2,7)
3	7 cm
4	$x=7$
5	22
6	\$67.50
7	-6
8	35%

Unit 16 - Area

Build the Formula

Item	Answer / scoring note
1	The rearranged rectangle has length b and height h; $A = b \times h$.
2	One triangle is $\frac{1}{2}$ of the parallelogram; $A = (b \times h) / 2$.
3	Height must be perpendicular to the base; a slanted side measures a different distance.

Try It

Item	Answer / scoring note
1	$12 \times 7 = 84 \text{ cm}^2$.
2	Divide by 2; 27 m^2 .
3	Triangle area 12 cm^2 ; total 52 cm^2 .

Develop

Item	Answer / scoring note
1	30 m^2
2	90 cm^2
3	38 m^2
4	32 cm^2
5	35 cm^2
6	16 m^2
7	54 in^2
8	6 cm
9	9m

10	68 cm^2
11	23 m^2
12	46 ft^2
13	Area 24 cm^2 ; perimeter 20 cm.

Apply and Reason

Item	Answer / scoring note
1	8.5 m^2 .
2	Garden area 13.5 m^2 ; exact quotient 4.5 bags, but bags are sold whole, so 5 bags must be bought.
3	162 ft^2 .
4	18 ft^2 outside the triangle.
5	Both are 30 cm^2 ; same base and perpendicular height give the same area.

Recalculate

Item	Answer / scoring note
1	Use perpendicular height 5 cm, not slant side: 50 cm^2 .
2	28 cm^2 .
3	Triangle is half: 20 cm^2 .
4	54 cm^2 .
5	Subtract cut-out: 68 m^2 .
6	57 m^2 .
7	Area is 24 cm^2 ; units must be square units.
8	Area 25 m^2 ; perimeter 20 m.

Mixed Review

Item	Answer / scoring note
1	35 cm^2
2	45 degrees
3	33 m^2
4	(3,-1)
5	$x=8$
6	50
7	9
8	$4\frac{1}{4}$

Unit 17 - Circles

Construction

Item	Answer / scoring note
1	Radius 4 cm -> diameter 8 cm; drawing: centre O, radius and diameter labelled; measured dimensions within about $\pm 2 \text{ mm}$.
2	Diameter 7 cm -> radius 3.5 cm; compass opening 3.5 cm; labels/check required.

Try It

Item	Answer / scoring note
1	$d=14$ m; $C=43.96$ m ≈ 44.0 m.
2	81; $254.34 \approx 254.3$ cm ² .
3	$100+140=240$; $x=120$ degrees.
4	3.14; pi.

Estimate Before the Formula

Item	Answer / scoring note
1	Any sensible estimate strictly between 18 and 36 cm ² with valid reasoning; about 28 cm ² is strong.
2	$A=3.14 \times 3 \times 3 = 28.26 \approx 28.3$ cm ² ; compare with estimate and explain reasonableness.

Develop

Item	Answer / scoring note
1	7.5 in
2	5m
3	62.8 cm
4	56.5 in
5	15.7 m
6	314.0 cm ²
7	50.2 ft ²
8	28.3 m ²
9	7.1 cm ²
10	105 degrees
11	45 degrees
12	Estimate 36 cm using $\pi \approx 3$; exact 37.7 cm using 3.14.

Apply and Reason

Item	Answer / scoring note
1	219.8 cm per wheel turn.
2	706.5 cm ² .
3	Fence 31.4 m; grass area 78.5 m ² .
4	Estimate with $\pi \approx 3$ gives 12 ft, but exact $C \approx 12.6$ ft. One 12-ft roll is not enough; at least two rolls are needed if sold only as whole rolls.
5	144 degrees.

Recalculate

Item	Answer / scoring note
1	Diameter was used as radius; $r=5$ cm, area 78.5 cm ² .
2	50.2 m ² .
3	Square the radius: 113.0 cm ² .
4	78.5 cm ² .
5	Circumference uses diameter, not r^2 ; $d=6$ cm $\rightarrow C=18.8$ cm.
6	$C=62.8$ cm; $A=314.0$ cm ² .
7	Central angles total 360 degrees; $x=240$ degrees.
8	72 degrees.
Recalculate 9	Diameter 6 cm $\rightarrow$ compass opening must be radius 3 cm.
Recalculate 10	Diameter 9 cm $\rightarrow$ radius/compass opening 4.5 cm; construction labels required.

Mixed Review

Item	Answer / scoring note
1	15.7 cm
2	18 cm^2
3	24 m
4	$(-4,1)$
5	$x=7$
6	18
7	7
8	3.14

Part 4 - Geometry and Measurement

Diagnostic Checkpoint 4

Item	Answer / scoring note
1	$(3,5)$
2	42 m^2
3	9 cm
4	Constructed circle: radius 2.5 cm; diameter AB = 5 cm. Centre O and diameter AB labelled. Accept about ± 2 mm for measured radius/diameter.
5	$(-4,-2)$
6	66 degrees
7	37.7 cm
8	45 cm^2

Part 5 - Data and Probability

Ready Check

Item	Answer / scoring note
1	56
2	14
3	$\frac{1}{4}$
4	108
5	3, 6, 9, 14
6	28%

Unit 18 - Central Tendency

Try It

Item	Answer / scoring note
1	Sum 28; divide by 4; mean 7.
2	11,12,14,15,18,20; middle 14 and 15; median 14.5.
3	$41 - 17 = 24$.

Develop

Item	Answer / scoring note
1	8
2	13
3	8
4	2.2
5	7
6	2.75
7	Mean 13; median 12; mode 12; range 6.
8	No mode.
9	Modes 3 and 6.
10	4.
11	With outlier mean 18.8; without outlier 22.5. The low outlier pulls the mean down.
12	11.

Outlier Check

Item	Answer / scoring note
1	Data A: mean 6.4; median 6; mode 6.
2	Data B: mean $10\frac{1}{3}$; median 6.5; mode 6.
3	Mean changed most; median changed slightly; mode did not change.
4	Do not automatically delete a real unusual measurement. Report/justify its effect and, when useful, compare statistics with and without it.

Apply and Reason

Item	Answer / scoring note
1	Mean 80; median 85; mode 85.
2	Median (\$510) is more typical; \$3000 is an outlier that pulls the mean to \$1002.
3	85.
4	Mean 2 mm; median 2 mm.
5	Mode, because it identifies the most frequently occurring shoe size.

Recalculate

Item	Answer / scoring note
1	Order first: 2,4,5,7,9; median 5.
2	6.
3	Even set uses average of middle two: $(5+8)/2 = 6.5$.
4	10.
5	Mode is the value 6, not the frequency 3.
6	7.
7	Mean 10; median 4; median is more representative because 34 is an outlier.
8	Mean changes from 10 to 13.2, an increase of 3.2; median stays 4.

Mixed Review

Item	Answer / scoring note
1	5
2	25.1 cm
3	21

4	42 m ²
5	(-1,3)
6	x=6
7	30%
8	6

Unit 19 - Graphs

Build a Circle Graph

Item	Answer / scoring note
Sports	$\frac{12}{30} = 40\%$; 144 degrees.
Gaming	$\frac{9}{30} = 30\%$; 108 degrees.
Reading	$\frac{6}{30} = 20\%$; 72 degrees.
Music	$\frac{3}{30} = 10\%$; 36 degrees.
Graph	Title, labels/legend, correct sectors; totals 100% and 360 degrees. Allow about +/-2 degrees per constructed boundary.

Try It

Item	Answer / scoring note
1	72 degrees.
2	$\frac{1}{4}$; 25%; 90 degrees.
3	$\frac{1}{4}$ of circle; 0.25; 20 people.

Develop

Item	Answer / scoring note
1	180, 108, 72 degrees.
2	54, 126, 144, 36 degrees.
3	Walk 25% / 90 degrees; bus 50% / 180 degrees; drive 25% / 90 degrees.
4	35%.
5	No; 40+35+30=105%, not 100%.
6	30 students.
7	Monday to Tuesday.
8	12 more wins.

Apply and Reason

Item	Answer / scoring note
1	Rent: \$800 and 144 degrees; food: \$500 and 90 degrees; transport: \$300 and 54 degrees; savings: \$400 and 72 degrees.
2	$\frac{72}{360} = 20\%$; 20% of 150 = 30 people.

Recalculate

Item	Answer / scoring note
1	30% of 360 = 108 degrees.
2	54 degrees.
3	45+30+30=105%, so the sections cannot make one circle graph.
4	No; 120+150+100=370 degrees.
5	25% of 200 = 50 students.
6	120 people.

Mixed Review

Item	Answer / scoring note
1	90 degrees
2	6
3	28.3 cm ²
4	70
5	30 m ²
6	x=6
7	-13
8	24

Unit 20 - Probability

Try It

Item	Answer / scoring note
1	$\frac{5}{10} = 50\%$.
2	$\frac{12}{40} = 30\%$.
3	2; 6 outcomes.

Probability Forms

Item	Answer / scoring note
1	P(black): ratio 4:12 = 1:3; fraction $\frac{4}{12} = \frac{1}{3}$; percent about 33.3%.
2	P(number greater than 2): ratio 4:6 = 2:3; fraction $\frac{2}{3}$; percent about 66.7%.
3	P(red): ratio 9:20; fraction $\frac{9}{20}$; decimal 0.45; percent 45%.

Develop

Item	Answer / scoring note
1	$\frac{1}{6}$
2	$\frac{1}{3}$
3	0; impossible.
4	$\frac{1}{4}$
5	$\frac{2}{5} = 0.4 = 40\%$.

6	$\frac{5}{6}$
7	$\frac{14}{60} \approx 23\%$; theoretical $\frac{1}{6} \approx 16.7\%$; experimental is higher in this sample.
8	1000 trials; larger samples usually stabilize closer to theoretical probability.
9	H1,H2,H3,H4,T1,T2,T3,T4; 8 outcomes.
10	$\frac{6}{36} = \frac{1}{6}$.
11	$\frac{1}{36}$.
12	$\frac{2}{12} = \frac{1}{6}$.

Apply and Reason

Item	Answer / scoring note
1	5:200 = 1:40; fraction $\frac{1}{40}$; decimal 0.025; percent 2.5%.
2	$\frac{15}{50} = 30\%$; predicted 120 of 400, assuming a representative random sample.
3	6 combinations; P(pizza and milk) = $\frac{1}{6}$.
4	Not fair. P(sum 7) = $\frac{6}{36} = \frac{1}{6}$; P(sum 2 or 12) = $\frac{2}{36} = \frac{1}{18}$.
5	No. $\frac{3}{4}$ is an experimental result from only 4 spins; theoretical probability depends on the spinner.

Two-Event Investigation

Item	Answer / scoring note
1	Two flips sample space HH, HT, TH, TT.
2	One head and one tail: favourable:total 2:4 = 1:2; fraction $\frac{1}{2}$; percent 50%.
Prediction	About 20 target events in 40 trials.
Trials	Student results vary; four outcome frequencies HH+HT+TH+TT must total 40.
Compare	Compare experimental percent with 50%; equality is not required. probability over many trials, though not monotonically or exactly.

Recalculate

Item	Answer / scoring note
1	Wrong total in the ratio. Favourable:total ratio = 2:6 = 1:3; fraction = $\frac{2}{6} = \frac{1}{3}$; percent $\approx 33.3\%$.
2	Favourable:total ratio = 3:10; fraction = $\frac{3}{10}$; percent = 30%.
3	TH was omitted; correct probability one of each = $\frac{2}{4} = \frac{1}{2}$.
4	6 outcomes.
5	No. P(tails) on the next fair flip remains $\frac{1}{2}$.
6	$\frac{1}{6}$.
7	A 10-flip sample need not be exactly 5 heads; the result alone does not prove unfairness.
8	1000 flips.

Mixed Review

Item	Answer / scoring note
1	Favourable:total ratio = 1:2; fraction = $\frac{1}{2}$; percent = 50%.
2	216 degrees
3	7
4	36 outcomes
5	18.8 cm
6	13
7	8
8	$\frac{7}{12}$

Part 5 - Data and Probability

Diagnostic Checkpoint 5

Item	Answer / scoring note
1	8 combined outcomes; 2 favourable. Theoretical ratio 1:4; fraction $\frac{1}{4}$; 25%. Experimental $\frac{12}{40} = 30\%$, which is greater than theory.
2	30 people.
3	6.5.
4	Ratio 1:4; fraction $\frac{1}{4}$; 25%.
5	For the three categories: 180 degrees, 108 degrees, 72 degrees; total 360. Construct and label accurately.
6	10.

End-of-Year System

Grade 7 Cumulative Check

Item	Answer / scoring note
1	Divisible by 2, 3, 4, 6, 8 and 9; not by 5 or 10.
2	$\frac{14}{0}$ is undefined; there is no q such that $0 \times q = 14$.
3	\$4.80 change.
4	36 full bottles.
5	234 students.
6	60 students.
7	0.777... with a bar over 7.
8	$\frac{3}{8}$.
9	$4\frac{1}{12}$.
10	$2\frac{1}{3}$.
11	$-1.2 < -\frac{3}{4} < 0.65 < \frac{2}{3}$.
12	Evening -14 C; overall change from morning +4 C.
13	Rule $5n + 2$; 25th term 127.
14	For $x=1,2,3,4$: $y=3,5,7,9$. Plot discrete figure-number points; do not join.
15	$4x+7$ is an expression; $4x+7=31$ is an equation; for $x=6$ the expression equals 31.
16	$x=7$; model shows the same operation on both sides; substitution verifies.

17	$x=5$; check $3(5)+5=20$.
18	$x=24$; check $\frac{24}{4}=6$.
19	Construct diameter 8 cm $\rightarrow$ radius 4 cm; circumference 25.1 cm; labels and measurement tolerance required.
20	Circumference 37.7 m; area 113.0 m^2 ; fence uses length, sod uses area.
21	Parallelogram 36 cm^2 ; triangle 18 cm^2 .
22	Perpendicular bisector; any point P on it has $PA=PB$.
23	$A'(3,2)$, $B'(-1,2)$, $C'(-1,-1)$.
24	After translation (2,-2); after 180-degree rotation (-2,2).
25	Mean $9\frac{1}{3}$; median 5.5; mode 5; range 25; median is a better typical value because of the outlier.
26	Without 29: mean 5.4, median 5, mode 5; the mean changes most (about 9.3 down to 5.4); the median goes from 5.5 to 5; the mode stays 5.
27	Walk 25%=90 degrees; Bus 35%=126 degrees; Bike 15%=54 degrees; Car 25%=90 degrees; graph total 100%/360 degrees.
28	Bus; 8 more than bike; about 70 of 200 predicted to take bus.
29	$3:10$; $\frac{3}{10}$; 30%.
30	8 outcomes; favourable H_2, H_4 ; $P=\frac{2}{8}=\frac{1}{4}$.
31	$\frac{13}{40}=32.5\%$; 7.5 percentage points above 25%; sampling variation explains the difference.

Final Recalculate

Item	Answer / scoring note
Q1-2	532 is divisible by 4 because 32 is. Follow-up: 2716 yes, 2718 no.
Q3-4	$6.2 \times 0.4 = 2.48$, less than 6.2. Follow-up $9.5 \times 0.2 = 1.9$, less than 9.5.
Q5-6	$\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$. Follow-up $\frac{2}{5} + \frac{1}{3} = \frac{11}{15}$.
Q7-8	$-4 - (-7) = 3$. Follow-up $3 - (-5) = 8$.
Q9-10	Whole = 60. Follow-up whole = 60.
Q11-12	$x=5$. Follow-up $x=5$.
Q13-14	$x=7$. Follow-up $x=6$.
Q15-16	$d=12 \rightarrow r=6 \rightarrow \text{area } 113.0 \text{ cm}^2$; $d=14 \rightarrow r=7 \rightarrow \text{area } 153.9 \text{ cm}^2$.
Q17-18	40% $\rightarrow$ 144 degrees; follow-up 45% $\rightarrow$ 162 degrees.
Q19-20	3 yellow of 8: ratio 3:8, fraction $\frac{3}{8}$, about 37.5%; follow-up $7:10$, $\frac{7}{10}$, 70%.