

Grade 8 Answer Key

How to mark

Question type	What to look for
Calculation	Final answer with correct units, signs and symbols. Accept equivalent forms (for example 0.5 or $\frac{1}{2}$) unless the question names a form. In this key, fractions are written as stacked fractions.
Word problem	A setup or equation, the calculation, and an answer with the unit. A correct number with no setup earns partial credit.
Explain	The essential points shown in the answer column. Accept other wording that makes the same mathematical point.
Error analysis	The error named, the process corrected, and the corrected result.
Drawing or graph	Check against the model description. Accept any drawing that meets every condition stated.

Routing a miss: C, P or S

C = concept error: send the student to the Recall page and the worked example. P = procedure error: redo Try It or Develop. S = slip or notation error: correct it and give one more try. Two wrong answers in one unit can be two unrelated slips, so look at the work before routing.

Manitoba Edition. Answers were computed in code wherever the item type allows and then matched to the workbook item by item. Drawing, graphing and explain questions show the expected result and are teacher-checked. Fractions are exact; decimals follow the rounding stated in each question.

Ready Check 1

Q	Question (start)	Type	Answer or expected points
1	Find 7×8 .	Calculation	56
2	List all the factors of 36.	Calculation	1, 2, 3, 4, 6, 9, 12, 18, 36
3	Is 4 236 divisible by 3? How do you know?	Calculation	Yes; the digit sum 15 is divisible by 3
4	Order from least to greatest: 4.5, 4.05, 4.15.	Calculation	4.05, 4.15, 4.5
5	Find 0.6×0.4 .	Calculation	0.24
6	Find the area of a square with side 9 cm.	Calculation	81 cm^2

Unit 1 Perfect Squares

Try It

Q	Question (start)	Type	Answer or expected points
1	A square has side 6 units. Its area is $6 \times 6 =$ <u> </u> square units, so...	Calculation	36; 36
2	$\sqrt{49}$ asks: what number times itself is 49? <u> </u> $\times$ <u> </u> = 49, so $\sqrt{49} =$ <u> </u> .	Calculation	7; 7; 7
3	$36 = 2^2 \times 3^2$. Both exponents are <u> </u> (even or odd), so 36 is <u> </u> (a o...	Calculation	even; a
4	The factors of 25 are 1, <u> </u> , 25. The middle factor is $\sqrt{25} =$ <u> </u> .	Calculation	5; 5

Develop

Q	Question (start)	Type	Answer or expected points
1	Find 8^2 .	Calculation	64
2	Find 11^2 .	Calculation	121
3	Find 15^2 .	Calculation	225
4	Find 20^2 .	Calculation	400
5	Find 13^2 .	Calculation	169
6	Find $\sqrt{81}$.	Calculation	9
7	Find $\sqrt{144}$.	Calculation	12
8	Find $\sqrt{169}$.	Calculation	13
9	Find $\sqrt{400}$.	Calculation	20
10	Find $\sqrt{900}$.	Calculation	30
11	Use prime factorization to decide if 196 is a perfect square. If it...	Calculation	Yes, $2^2 \times 7^2$; $\sqrt{196} = 14$
12	Use prime factorization to decide if 90 is a perfect square. If it...	Calculation	No, $2 \times 3^2 \times 5$ has an odd exponent

Q	Question (start)	Type	Answer or expected points
13	Use prime factorization to decide if 324 is a perfect square. If it...	Calculation	Yes, $2^2 \times 3^4$; $\sqrt{324} = 18$
14	Use prime factorization to decide if 500 is a perfect square. If it...	Calculation	No, $2^2 \times 5^3$ has an odd exponent
15	List all the factors of 64. Is 64 a perfect square? Use the middle...	Explain	Factors [1, 2, 4, 8, 16, 32, 64]; yes, middle factor 8, $\sqrt{64} = 8$
16	Shade a square region with area 25 square units on the grid space....	Drawing or graph	5 units; $5 \times 5 = 25$
17	A square has area 49 cm^2 . What is the length of each side?	Calculation	7 cm
18	A square has side length 17 cm. What is its area?	Calculation	289 cm^2
19	Find the square of 25.	Calculation	625
20	Why can a square with area 40 square units not have a whole-number...	Explain	$6^2 = 36$ and $7^2 = 49$; 40 lies between them, so no whole number squared is 40

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A square garden has area 256 m^2 . How long is each side? What is the...	Calculation	Side 16 m; perimeter 64 m
2	A square floor is covered with 361 square tiles. How many tiles are...	Calculation	19
3	A square mural is 15 m by 15 m. One can of paint covers 25 m^2 . How...	Calculation	Area 225 m^2 ; 9 cans
4	Sam says 48 is a perfect square because $6 \times 8 = 48$. Is Sam right? E...	Explain	No. A perfect square needs two equal factors; 6×8 uses different factors. $48 = 2^4 \times 3$ has an odd exponent, and $6^2 = 36$ and $7^2 = 49$
5	A square patio has area 81 m^2 . A fence goes all the way around it....	Calculation	Side 9 m; perimeter 36 m

Q	Question (start)	Type	Answer or expected points
6	Square A has side 14 cm. Square B has area 200 cm^2 . Which square ha...	Calculation	A has area 196 cm^2 ; B is larger by 4 cm^2

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student writes $7^2 = 14$. What went wrong? Give the correct answer.	Error analysis	7^2 means $7 \times 7 = 49$; 14 is 7×2
2	Find 9^2 .	Calculation	81
3	A student writes $\sqrt{81} = 40.5$. What went wrong? Give the correct answer.	Error analysis	$\sqrt{81}$ asks for the number that times itself is 81, not $81 \div 2$; $\sqrt{81} = 9$
4	Find $\sqrt{225}$.	Calculation	15
5	A student says 45 is a perfect square because $5 \times 9 = 45$. What went...	Error analysis	5×9 uses two different factors; $45 = 3^2 \times 5$ has an odd exponent, so 45 is not a perfect square
6	Is 100 a perfect square? Use prime factorization.	Calculation	Yes, $2^2 \times 5^2$; $\sqrt{100} = 10$

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Is 6 138 divisible by 3? How do you know?	Calculation	Yes; digit sum $6+1+3+8 = 18$ is divisible by 3
2	Find $5.6 + 3.85$.	Calculation	9.45
3	Find $\frac{1}{4} + \frac{2}{5}$.	Calculation	$\frac{13}{20}$
4	Find $-9 + 4$.	Calculation	-5
5	Find 15% of 80.	Calculation	12
6	Find the mean of 3, 9, 12, 15, 21.	Calculation	12
7	Find 0.8×0.7 .	Calculation	0.56

Q	Question (start)	Type	Answer or expected points
8	A triangle has base 12 cm and height 7 cm. Find its area.	Calculation	42 cm ²

Unit 2 Square Roots and Estimating

Try It

Q	Question (start)	Type	Answer or expected points
1	$\sqrt{30}$: $5^2 = \underline{\hspace{1cm}}$ and $6^2 = 36$, so $\sqrt{30}$ is between $\underline{\hspace{1cm}}$ and $\underline{\hspace{1cm}}$.	Calculation	25; 5; 6
2	$\sqrt{10}$ is between 3 and 4 because $3^2 = 9$ and $4^2 = \underline{\hspace{1cm}}$. 10 is 1 from 9,...	Calculation	16; 3
3	$4.5^2 = 4.5 \times 4.5 = \underline{\hspace{1cm}}$. Is $\sqrt{20}$ less than or greater than 4.5?	Calculation	20.25; less than
4	A calculator shows $\sqrt{42} = 6.480740698$. To 1 decimal place this is $\underline{\hspace{1cm}}$.	Calculation	6.5

Develop

Q	Question (start)	Type	Answer or expected points
1	Between which two consecutive whole numbers is $\sqrt{7}$?	Calculation	2 and 3
2	Between which two consecutive whole numbers is $\sqrt{23}$?	Calculation	4 and 5
3	Between which two consecutive whole numbers is $\sqrt{50}$?	Calculation	7 and 8
4	Between which two consecutive whole numbers is $\sqrt{90}$?	Calculation	9 and 10
5	Between which two consecutive whole numbers is $\sqrt{115}$?	Calculation	10 and 11
6	Between which two consecutive whole numbers is $\sqrt{200}$?	Calculation	14 and 15
7	Estimate $\sqrt{8}$ to the nearest whole number.	Calculation	3
8	Estimate $\sqrt{27}$ to the nearest whole number.	Calculation	5
9	Estimate $\sqrt{35}$ to the nearest whole number.	Calculation	6

Q	Question (start)	Type	Answer or expected points
10	Estimate $\sqrt{60}$ to the nearest whole number.	Calculation	8
11	Estimate $\sqrt{85}$ to the nearest whole number.	Calculation	9
12	Estimate $\sqrt{130}$ to the nearest whole number.	Calculation	11
13	Use a calculator. Find $\sqrt{2}$ to 1 decimal place.	Calculation	1.4
14	Use a calculator. Find $\sqrt{11}$ to 1 decimal place.	Calculation	3.3
15	Use a calculator. Find $\sqrt{19}$ to 1 decimal place.	Calculation	4.4
16	Use a calculator. Find $\sqrt{72}$ to 1 decimal place.	Calculation	8.5
17	Use a calculator. Find $\sqrt{150}$ to 1 decimal place.	Calculation	12.2
18	Use a calculator. Find $\sqrt{300}$ to 1 decimal place.	Calculation	17.3
19	List all the whole numbers whose square root is between 3 and 4.	Calculation	10, 11, 12, 13, 14, 15
20	How many whole numbers have a square root between 8 and 9?	Calculation	16
21	Is $\sqrt{50}$ closer to 7 or to 8? Show the perfect squares you used.	Calculation	7; 49 is 1 below 50 and 64 is 14 above
22	Your calculator shows $\sqrt{20} = 4.472135955$. Why is this an approximation?	Explain	The decimal for $\sqrt{20}$ never ends or repeats, so the calculator shows only some of its digits

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A square canvas has area 90 cm^2 . Estimate the side length to 1 deci...	Calculation	9.5 cm
2	A square park has area 500 m^2 . Find the side length to 1 decimal pl...	Word problem	Side 22.4 m; perimeter 89.6 m
3	Which is greater, $\sqrt{45}$ or 6.5? Explain using squares.	Explain	$\sqrt{45}$; $6.5^2 = 42.25$, which is less than 45
4	Order from least to greatest: 3.5, $\sqrt{12}$, 3.4.	Calculation	3.4, $\sqrt{12}$, 3.5 ($\sqrt{12} \approx 3.46$)
5	A square tile has area 150 cm^2 . Between which two whole numbers is...	Calculation	12 and 13 cm
6	Sam says $\sqrt{50} = 25$ because $25 \times 2 = 50$. Is Sam right? Explain.	Explain	No. $\sqrt{50}$ means a number times itself equals 50. $25 \times 25 = 625$. $\sqrt{50}$ is about 7.1

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student writes $\sqrt{20} = 10$ because $20 \div 2 = 10$. What went wrong? Est...	Error analysis	$\sqrt{20}$ is not half of 20. $4^2 = 16$ and $5^2 = 25$, so $\sqrt{20}$ is between 4 and 5 (about 4.5)
2	Between which two whole numbers is $\sqrt{18}$?	Calculation	4 and 5
3	A student says $\sqrt{26}$ is closer to 6 because 26 is near 36. What went...	Error analysis	26 is 1 from 25 and 10 from 36, so $\sqrt{26}$ is closer to 5 (about 5.1)
4	Is $\sqrt{70}$ closer to 8 or to 9?	Calculation	8; 70 is 6 from 64 and 11 from 81
5	A student writes $\sqrt{30} = 5.477225575$ exactly. What is wrong with "exa...	Error analysis	The calculator rounds; the decimal never ends, so 5.477... is an approximation
6	Round $\sqrt{30}$ to 1 decimal place.	Calculation	5.5

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Find 17^2 .	Calculation	289
2	Find $\sqrt{961}$.	Calculation	31
3	Find $\sqrt{121}$.	Calculation	11
4	Find 16^2 .	Calculation	256
5	Find $4.7 - 2.35$.	Calculation	2.35
6	Find $\frac{2}{3} + \frac{1}{6}$.	Calculation	$\frac{5}{6}$
7	Find $-6 - (-9)$.	Calculation	3
8	Find 45% of 80.	Calculation	36

Checkpoint 1

Q	Question (start)	Type	Answer or expected points
1	Find 14^2 .	Calculation	196
2	Find $\sqrt{324}$.	Calculation	18
3	Use prime factorization to decide if 90 is a perfect square.	Calculation	No: $90 = 2 \times 3^2 \times 5$ has an odd exponent
4	Between which two consecutive whole numbers is $\sqrt{70}$?	Calculation	8 and 9
5	Use a calculator. Find $\sqrt{45}$ to 1 decimal place.	Calculation	6.7
6	A square garden has area 196 m^2 . Find the side length and the perim...	Calculation	Side 14 m; perimeter 56 m
7	Estimate $\sqrt{30}$ to the nearest whole number.	Calculation	5
8	Which is greater, $\sqrt{26}$ or 5.2? Use squares to explain.	Explain	5.2; $5.2^2 = 27.04$, which is greater than 26

Ready Check 2

Q	Question (start)	Type	Answer or expected points
1	Find 35% of 80.	Calculation	28
2	Write 0.4 as a percent.	Calculation	40%
3	Write the ratio 15:35 in simplest form.	Calculation	3:7
4	Find the missing term: $3:4 = 15:___$.	Calculation	20
5	Write $\frac{7}{20}$ as a percent.	Calculation	35%
6	A \$40 shirt is 25% off. Find the sale price.	Calculation	\$30

Unit 3 Percents of 0% and Over

Try It

Q	Question (start)	Type	Answer or expected points
1	120% of 70 = $1.2 \times 70 = \underline{\hspace{1cm}}$.	Calculation	84
2	0.4% of 300 = $0.004 \times 300 = \underline{\hspace{1cm}}$.	Calculation	1.2
3	125% as a decimal is $125 \div 100 = \underline{\hspace{1cm}}$.	Calculation	1.25
4	0.25% as a decimal is $0.25 \div 100 = \underline{\hspace{1cm}}$.	Calculation	0.0025

Develop

Q	Question (start)	Type	Answer or expected points
1	Write 140% as a decimal and as a fraction in simplest form.	Calculation	1.4; $\frac{7}{5}$
2	Write 225% as a decimal and as a fraction in simplest form.	Calculation	2.25; $\frac{9}{4}$
3	Write 0.5% as a decimal and as a fraction in simplest form.	Calculation	0.005; $\frac{1}{200}$
4	Write 0.2% as a decimal and as a fraction in simplest form.	Calculation	0.002; $\frac{1}{500}$
5	Write 175% as a decimal and as a fraction in simplest form.	Calculation	1.75; $\frac{7}{4}$
6	Write 0.75% as a decimal and as a fraction in simplest form.	Calculation	0.0075; $\frac{3}{400}$
7	Find 150% of 60.	Calculation	90
8	Find 200% of 35.	Calculation	70
9	Find 0.5% of 400.	Calculation	2
10	Find 0.1% of 5000.	Calculation	5
11	Find 120% of 85.	Calculation	102
12	Find 0.25% of 800.	Calculation	2
13	Write 1.35 as a percent.	Calculation	135%

Q	Question (start)	Type	Answer or expected points
14	Write $\frac{3}{2}$ as a percent.	Calculation	150%
15	Write 0.004 as a percent.	Calculation	0.4%
16	Write $\frac{1}{400}$ as a percent.	Calculation	0.25%
17	Write 2.5 as a percent.	Calculation	250%
18	Write $\frac{1}{8}$ as a percent.	Calculation	12.5%
19	Suppose GST is 5% and PST is 7%. An item costs \$80. Find the total...	Calculation	Tax \$9.60; total \$89.60
20	Suppose GST is 5% and PST is 7%. An item costs \$250. Find the total...	Calculation	Tax \$30.00; total \$280.00
21	Suppose GST is 5% and PST is 7%. An item costs \$120. Find the total...	Calculation	Tax \$14.40; total \$134.40
22	Find 50% of 0.8%.	Calculation	0.4%
23	Find 20% of 25%.	Calculation	5%

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A town had 2000 people. It now has 130% of that. How many people li...	Calculation	2600
2	A savings account pays 0.5% interest in a year on \$3000. How much i...	Calculation	\$15
3	A store buys a game for \$40 and sells it for 175% of that price. Wh...	Calculation	\$70
4	A salt solution is 0.2% salt. How many grams of salt are in 5000 g...	Calculation	10 g
5	Shade 135% using the grids. How many full grids and how many extra...	Drawing or graph	1 full grid and 35 extra squares (of 100)
6	Suppose GST is 5% and PST is 7%. A gift costs \$150. Find the total...	Calculation	\$168.00

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student writes $150\% = 0.15$. What went wrong? Give the correct dec...	Error analysis	$150\% = 150 \div 100 = 1.5$. 0.15 is 15%
2	Write 250% as a decimal.	Calculation	2.5
3	A student writes $0.5\% = 0.5$. What went wrong? Give the correct deci...	Error analysis	0.5% means $0.5 \div 100 = 0.005$
4	Write 0.8% as a decimal.	Calculation	0.008
5	A student says 200% of 30 is 30 because 100% is the whole. What wen...	Error analysis	200% is two wholes: $2 \times 30 = 60$
6	Find 300% of 20.	Calculation	60

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Find 19^2 .	Calculation	361
2	Find 18^2 .	Calculation	324
3	Find $\sqrt{256}$.	Calculation	16
4	Use a calculator. Find $\sqrt{3}$ to 1 decimal place.	Calculation	1.7
5	Find $\sqrt{289}$.	Calculation	17
6	Between which two consecutive whole numbers is $\sqrt{10}$?	Calculation	3 and 4
7	Between which two consecutive whole numbers is $\sqrt{30}$?	Calculation	5 and 6
8	Estimate $\sqrt{13}$ to the nearest whole number.	Calculation	4

Unit 4 Ratio and Rate

Try It

Q	Question (start)	Type	Answer or expected points
1	The ratio 6:9 in simplest form is __ : __.	Calculation	2; 3
2	2 red : 7 blue. Parts in all = $2 + 7 =$ __. Red is __ out of __ parts.	Calculation	9; 2; 9
3	210 km in 3 h. $210 \div 3 =$ __ km in 1 h.	Calculation	70
4	Is "\$2.50 for 1 L" a ratio or a rate?	Calculation	rate

Develop

Q	Question (start)	Type	Answer or expected points
1	A bag has 12 red and 18 blue marbles. Write the ratio of red to blu...	Calculation	2:3
2	A team has 8 forwards, 12 midfielders and 4 defenders. Write the ra...	Word problem	2:3:1
3	A class has 15 cats and 25 dogs among its pets. Write the ratio of...	Calculation	5:3
4	Write the ratio 20 cm to 1.5 m with the same units, in simplest form.	Calculation	2:15
5	The ratio of red to blue marbles is 3:5. What fraction of the marbl...	Calculation	$\frac{3}{8}$ red; $\frac{5}{8}$ blue
6	The ratio of boys to girls is 4:7. There are 33 students. How many...	Calculation	12 boys; 21 girls
7	Red : blue = 2:3. In a bag of 40 marbles, how many are red?	Calculation	16
8	The ratio of cats to dogs is 3:4. What fraction of the animals are...	Calculation	$\frac{4}{7}$
9	Find the unit rate: 240 km in 3 hours.	Calculation	80 km/h
10	Find the unit rate: \$6.50 for 5 L of milk.	Calculation	\$1.30 per litre

Q	Question (start)	Type	Answer or expected points
11	Find the unit rate in dollars per book: 4 books for \$18.	Calculation	\$4.50 per book
12	Find the unit rate: 360 words typed in 6 minutes.	Calculation	60 words per minute
13	Find the unit rate in dollars per metre: 15 m of ribbon costs \$12.	Calculation	\$0.80 per metre
14	A heart beats 90 times in 1.5 minutes. Find the rate in beats per m...	Calculation	60 beats per minute
15	Explain why 75 km/h cannot be written as a percent.	Explain	A rate compares different kinds of things (distance and time). A percent compares a part to a whole of the same kind.
16	Is "3 red to 5 blue" a ratio or a rate? Is "\$12 for 3 kg" a ratio o...	Explain	3 red to 5 blue is a ratio (same kind of thing). \$12 for 3 kg is a rate (different units)

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	Trail mix has nuts : raisins : chocolate in the ratio 4:3:1. A batc...	Word problem	8 cups nuts; 6 cups raisins; 2 cups chocolate
2	Maria types 135 words in 3 minutes. At this rate, how many words do...	Calculation	450 words
3	Pens: 6 for \$4.50 or 10 for \$7.00. Which is the better buy? Show th...	Calculation	10 for \$7.00 (\$0.70 each vs \$0.75 each)
4	A car travels 285 km on 19 L of gas. Find the rate in km per litre.	Calculation	15 km/L
5	Paint is mixed blue : yellow : white = 2:1:5. How much of each is i...	Calculation	6 L blue; 3 L yellow; 15 L white
6	A class has 12 girls and 18 boys. What fraction of the class are gi...	Calculation	$\frac{2}{5}$

Recalculate

Q	Question (start)	Type	Answer or expected points
1	The ratio of red to blue is 2:3. A student says $\frac{2}{3}$ of the marbles...	Error analysis	2:3 is part-to-part. Red is 2 of 5 parts, so $\frac{2}{5}$ are red
2	The ratio of cats to dogs is 3:4. What fraction are dogs?	Calculation	$\frac{4}{7}$
3	Maya runs 5 km in 25 min. A student says her rate is $5 \div 25 = 20\%$	Error analysis	A rate has units. $5 \div 25 = 0.2$ km per minute (or 5 minutes per km). It is not a percent
4	Find the unit rate: 150 km in 2 h.	Calculation	75 km/h
5	\$12 buys 3 kg. A student finds the rate as $3 \div 12 = \$0.25$ per kg. W...	Error analysis	The rate per kg is cost $\div$ kg = $12 \div 3 = \$4$ per kg
6	\$15 buys 6 L. Find the cost per litre.	Calculation	\$2.50 per litre

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Estimate $\sqrt{29}$ to the nearest whole number.	Calculation	5
2	Find 21^2 .	Calculation	441
3	Find $\sqrt{361}$.	Calculation	19
4	Use a calculator. Find $\sqrt{13}$ to 1 decimal place.	Calculation	3.6
5	Find 0.5% of 600.	Calculation	3
6	Between which two consecutive whole numbers is $\sqrt{41}$?	Calculation	6 and 7
7	Write 165% as a decimal and as a fraction in simplest form.	Calculation	1.65; $\frac{33}{20}$
8	Write 1.6 as a percent.	Calculation	160%

Unit 5 Proportional Reasoning

Try It

Q	Question (start)	Type	Answer or expected points
1	5 notebooks cost \$12.50. One notebook costs $\$12.50 \div 5 = \$__$.	Calculation	2.50
2	$\frac{2}{3} = \frac{x}{18}$. $3 \times __ = 18$, so $x = 2 \times __ = __$.	Calculation	6; 6; 12
3	Find 10% of 90 = $__$. Then 20% of 90 = $__$.	Calculation	9; 18
4	A map scale is 1 cm : 25 km. 3 cm on the map is $__$ km.	Calculation	75

Develop

Q	Question (start)	Type	Answer or expected points
1	Solve: $\frac{5}{6} = \frac{x}{42}$	Calculation	35
2	Solve: $\frac{9}{12} = \frac{x}{16}$	Calculation	12
3	Solve: $\frac{4}{7} = \frac{x}{35}$	Calculation	20
4	Solve: $\frac{5}{8} = \frac{15}{y}$	Calculation	24
5	Solve: $\frac{7}{y} = \frac{21}{12}$	Calculation	4
6	Solve: $\frac{z}{9} = \frac{20}{36}$	Calculation	5
7	5 notebooks cost \$12.50. Find the cost of 8 notebooks.	Calculation	\$20.00
8	A tap fills 18 L in 4 min. How many litres in 10 min?	Calculation	45 L
9	A snail travels 36 cm in 9 min. How far in 25 min?	Calculation	100 cm
10	6 cans cost \$7.20. How much do 15 cans cost?	Calculation	\$18.00
11	15% of a number is 12. Find the number.	Calculation	80

Q	Question (start)	Type	Answer or expected points
12	What percent of 60 is 15?	Calculation	25%
13	Increase 40 by 25%.	Calculation	50
14	A \$60 item is reduced by 35%. Find the sale price.	Calculation	\$39
15	On a map, 1 cm represents 25 km. Two towns are 6.4 cm apart on the...	Calculation	160 km
16	A model car is built at a scale of 1:48. The model is 9 cm long. Ho...	Calculation	432 cm
17	$\frac{5}{8}$ of a pizza is eaten. Say what the 5 and the 8 mean.	Calculation	The pizza is cut into 8 equal slices and 5 slices are eaten (a fraction)
18	A car drives 120 km in 2 h. This is the fraction $\frac{120}{2}$. Say what i...	Calculation	A rate: 120 km per 2 h, which is 60 km per hour
19	A class has 12 girls and 15 boys. Write girls to boys as a fraction...	Word problem	$\frac{12}{15} = \frac{4}{5}$. A ratio of girls to boys, 4 : 5
20	15 muffins are shared equally among 4 people. Write $\frac{15}{4}$ as a divi...	Calculation	$15 \div 4 = 3.75$ muffins each (a quotient)
21	A bag has 3 red and 5 blue marbles. One marble is picked without lo...	Calculation	The probability of picking red: 3 favourable outcomes out of 8 equal outcomes

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A recipe uses 3 cups of flour for 24 muffins. How many cups are nee...	Calculation	7.5 cups
2	A car uses 8 L of gas per 100 km. How much gas is needed for 350 km?	Calculation	28 L
3	Suppose 1 Canadian dollar is worth 0.75 US dollars. How many Canadi...	Calculation	\$80
4	Juice A: 1.5 L for \$4.50. Juice B: 2.5 L for \$6.50. Which is the be...	Calculation	B (\$2.60 per L vs \$3.00 per L)

Q	Question (start)	Type	Answer or expected points
5	A student scored 45 out of 60 on one test and 36 out of 50 on another...	Calculation	75% vs 72%; the first test
6	A photo 10 cm wide and 15 cm tall is enlarged to be 24 cm wide. How...	Calculation	36 cm

Recalculate

Q	Question (start)	Type	Answer or expected points
1	2:3 = 6:? A student adds 4 to both terms and writes 2:3 = 6:7. What...	Error analysis	Equal ratios are found by multiplying both terms by the same number: $2 \times 3 = 6$, so $3 \times 3 = 9$. 2:3 = 6:9
2	Solve: $\frac{3}{5} = \frac{x}{25}$	Calculation	15
3	A student finds 20% of 150 by calculating $150 \times 20 = 3000$. What went...	Error analysis	20% means 20 per hundred: $0.2 \times 150 = 30$
4	Find 15% of 60.	Calculation	9
5	4 cans cost \$6. A student says 10 cans cost \$12 because 10 is 6 more...	Error analysis	Use the unit rate: $\$6 \div 4 = \$1.50$ per can, so 10 cans cost $10 \times 1.50 = \$15$
6	3 kg cost \$7.50. How much do 8 kg cost?	Calculation	\$20.00

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Estimate $\sqrt{38}$ to the nearest whole number.	Calculation	6
2	Write 0.8% as a decimal and as a fraction in simplest form.	Calculation	0.008; $\frac{1}{125}$
3	A box has 16 pens and 24 pencils. Write the ratio of pens to pencils...	Calculation	2:3
4	Write 0.009 as a percent.	Calculation	0.9%
5	The ratio of cats to dogs is 3:5. There are 40 in all. How many cats...	Calculation	15 cats; 25 dogs

Q	Question (start)	Type	Answer or expected points
6	Find 22^2 .	Calculation	484
7	Use a calculator. Find $\sqrt{26}$ to 1 decimal place.	Calculation	5.1
8	Find $\sqrt{441}$.	Calculation	21

Checkpoint 2

Q	Question (start)	Type	Answer or expected points
1	Write 175% as a decimal.	Calculation	1.75
2	Find 0.4% of 500.	Calculation	2
3	Beads are red : blue : green = 2:3:5. There are 40 beads. How many...	Calculation	8 red; 12 blue; 20 green
4	Find the unit rate: 180 km in 2.5 hours.	Calculation	72 km/h
5	Solve: $\frac{5}{8} = \frac{35}{y}$	Calculation	56
6	What percent of 48 is 12?	Calculation	25%
7	3 notebooks cost \$5.40. Find the cost of 7 notebooks.	Calculation	\$12.60
8	Suppose GST is 5% and PST is 7%. An item costs \$50. Find the total...	Calculation	\$56.00

Ready Check 3

Q	Question (start)	Type	Answer or expected points
1	Find $\frac{1}{2} + \frac{1}{3}$.	Calculation	$\frac{5}{6}$
2	Write $\frac{7}{4}$ as a mixed number.	Calculation	$1\frac{3}{4}$
3	Find $-8 + 3$.	Calculation	-5
4	Find $-6 - (-2)$.	Calculation	-4
5	Find $3.4 + 2.75$.	Calculation	6.15
6	Find $12 - 8 \div 4 \times 2$.	Calculation	8

Unit 6 Multiplying Fractions and Mixed Numbers

Try It

Q	Question (start)	Type	Answer or expected points
1	$\frac{2}{5} \times \frac{3}{4} = \frac{2 \times 3}{5 \times 4} = \frac{\quad}{20} = \frac{3}{\quad}$.	Calculation	6; 10
2	Change $2\frac{1}{3}$ to an improper fraction: $2 \times 3 + 1 = \underline{\quad}$, so $2\frac{1}{3} = \frac{\quad}{3}$.	Calculation	7; 7
3	$\frac{5}{6} \times 12 = \frac{5}{6} \times \frac{12}{1} = \frac{60}{6} = \underline{\quad}$.	Calculation	10
4	A rectangle is divided into 5 columns and 4 rows. Shade 2 columns a...	Drawing or graph	6

Develop

Q	Question (start)	Type	Answer or expected points
1	Find $\frac{2}{5} \times 3$.	Calculation	$1\frac{1}{5}$
2	Find $\frac{3}{4} \times 8$.	Calculation	6
3	Find $\frac{5}{6} \times 9$.	Calculation	$7\frac{1}{2}$
4	Find $\frac{7}{12} \times 4$.	Calculation	$2\frac{1}{3}$
5	Find $\frac{2}{3} \times \frac{3}{5}$.	Calculation	$\frac{2}{5}$
6	Find $\frac{3}{4} \times \frac{2}{9}$.	Calculation	$\frac{1}{6}$
7	Find $\frac{5}{8} \times \frac{4}{15}$.	Calculation	$\frac{1}{6}$
8	Find $\frac{7}{10} \times \frac{5}{14}$.	Calculation	$\frac{1}{4}$
9	Find $1\frac{2}{3} \times 2\frac{1}{4}$.	Calculation	$3\frac{3}{4}$
10	Find $2\frac{1}{4} \times 1\frac{1}{3}$.	Calculation	3
11	Find $3\frac{1}{2} \times \frac{2}{7}$.	Calculation	1

Q	Question (start)	Type	Answer or expected points
12	Find $1\frac{2}{5} \times 2\frac{1}{2}$.	Calculation	$3\frac{1}{2}$
13	Find $2\frac{3}{4} \times \frac{2}{3}$.	Calculation	$1\frac{5}{6}$
14	Find $\frac{1}{2} + \frac{1}{3} \times \frac{3}{4}$.	Calculation	$\frac{3}{4}$
15	Find $(\frac{2}{3} + \frac{1}{6}) \times \frac{4}{5}$.	Calculation	$\frac{2}{3}$
16	Find $\frac{3}{4} \times \frac{2}{3} - \frac{1}{4}$.	Calculation	$\frac{1}{4}$

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A recipe needs $\frac{2}{3}$ cup of sugar for one batch. How much sugar is n...	Calculation	$\frac{1}{2}$
2	A garden is $2\frac{1}{2}$ m by $1\frac{3}{5}$ m. Find its area in square metres.	Calculation	4
3	A jug holds $\frac{4}{5}$ L. A student drinks $\frac{3}{8}$ of it. How many litres we...	Calculation	$\frac{3}{10}$
4	A shop is open $2\frac{1}{4}$ hours. One third of that time is spent on sto...	Calculation	$\frac{3}{4}$
5	A class has 30 students. $\frac{2}{3}$ of them play sports and $\frac{3}{5}$ of the s...	Word problem	12
6	Is $\frac{1}{2} \times \frac{1}{3}$ greater than or less than $\frac{1}{3}$? Explain.	Explain	Less than. Taking half of $\frac{1}{3}$ gives $\frac{1}{6}$, which is smaller than $\frac{1}{3}$

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student writes $\frac{3}{5} \times \frac{2}{7} = \frac{5}{12}$. What went wrong? Give the cor...	Error analysis	Multiply tops and bottoms, not add: $\frac{3 \times 2}{5 \times 7} = \frac{6}{35}$
2	Find $\frac{3}{5} \times \frac{5}{6}$.	Calculation	$\frac{1}{2}$
3	A student writes $2\frac{1}{2} \times 3\frac{1}{2} = 6\frac{1}{4}$ by multiplying whole part...	Error analysis	Change to improper fractions first: $\frac{5}{2} \times \frac{7}{2} = \frac{35}{4} = 8\frac{3}{4}$
4	Find $1\frac{1}{2} \times 2\frac{1}{3}$.	Calculation	$3\frac{1}{2}$
5	A student writes $\frac{3}{4} \times 5 = \frac{15}{20}$. What went wrong? Give the corre...	Error analysis	5 is $\frac{5}{1}$, so the denominator stays 4: $\frac{15}{4} = 3\frac{3}{4}$
6	Find $\frac{2}{3} \times 6$.	Calculation	4

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	The ratio of adults to children is 2:7. There are 45 in all. How ma...	Calculation	10 adults; 35 children
2	Find the unit rate: 270 km in 3 hours.	Calculation	90 km per hour
3	Find 120% of 45.	Calculation	54
4	Write 2.25 as a percent.	Calculation	225%
5	Find $\sqrt{484}$.	Calculation	22
6	Between which two consecutive whole numbers is $\sqrt{67}$?	Calculation	8 and 9
7	Increase 80 by 15%.	Calculation	92
8	Solve: $\frac{2}{5} = \frac{x}{35}$	Calculation	14

Unit 7 Dividing Fractions and Mixed Numbers

Try It

Q	Question (start)	Type	Answer or expected points
1	There are __ halves in 1 whole, so $3 \div \frac{1}{2} = \underline{\quad}$.	Calculation	2; 6
2	The reciprocal of $\frac{3}{4}$ is $\frac{\quad}{\quad}$.	Calculation	4; 3
3	$\frac{2}{3} \div \frac{1}{9} = \frac{2}{3} \times \frac{9}{1} = \underline{\quad}$.	Calculation	6
4	Check: $9 \times \frac{1}{6} = \frac{9}{6} = \frac{\quad}{2}$.	Calculation	3

Develop

Q	Question (start)	Type	Answer or expected points
1	Find $4 \div \frac{1}{3}$.	Calculation	12
2	Find $6 \div \frac{2}{3}$.	Calculation	9
3	Find $3 \div \frac{3}{4}$.	Calculation	4
4	Find $10 \div \frac{5}{6}$.	Calculation	12
5	Find $\frac{3}{4} \div 3$.	Calculation	$\frac{1}{4}$
6	Find $\frac{2}{5} \div 4$.	Calculation	$\frac{1}{10}$
7	Find $\frac{9}{10} \div 6$.	Calculation	$\frac{3}{20}$
8	Find $\frac{5}{8} \div \frac{1}{4}$.	Calculation	$2\frac{1}{2}$
9	Find $\frac{5}{6} \div \frac{2}{3}$.	Calculation	$1\frac{1}{4}$
10	Find $\frac{7}{8} \div \frac{7}{16}$.	Calculation	2
11	Find $\frac{5}{9} \div 3\frac{1}{3}$.	Calculation	$\frac{1}{6}$
12	Find $3\frac{1}{3} \div \frac{5}{9}$.	Calculation	6

Q	Question (start)	Type	Answer or expected points
13	Find $3\frac{1}{3} \div 1\frac{1}{4}$.	Calculation	$2\frac{2}{3}$
14	Find $1\frac{3}{4} \div \frac{7}{8}$.	Calculation	2
15	Find $3\frac{1}{4} \div \frac{1}{2}$.	Calculation	$6\frac{1}{2}$
16	Find $\frac{2}{3} \div \frac{4}{9} \times \frac{1}{3}$.	Calculation	$\frac{1}{2}$
17	Find $(\frac{3}{4} + \frac{1}{4}) \div \frac{2}{5}$.	Calculation	$2\frac{1}{2}$

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A ribbon is 6 m long. It is cut into pieces that are $\frac{3}{4}$ m long. H...	Calculation	8
2	A jug has $\frac{5}{6}$ L of juice. Each glass holds $\frac{1}{12}$ L. How many glass...	Calculation	10
3	Each batch uses $\frac{2}{3}$ cup of sugar. There are 4 cups of sugar. How m...	Calculation	6
4	A cyclist rides $2\frac{1}{2}$ km in $\frac{1}{4}$ hour. How many km does she ride i...	Calculation	10
5	A $3\frac{1}{2}$ m board is cut into shelves that are $\frac{7}{8}$ m long. How many...	Calculation	4
6	Explain why dividing by $\frac{1}{2}$ gives the same result as multiplying by 2.	Explain	There are 2 halves in every whole, so dividing by $\frac{1}{2}$ counts how many halves fit. That is the same as $\times 2$

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student writes $\frac{3}{4} \div \frac{1}{2} = \frac{3}{8}$. What went wrong? Give the corr...	Error analysis	Dividing by $\frac{1}{2}$ means multiplying by the reciprocal $\frac{2}{1}$: $\frac{3}{4} \times 2 = \frac{3}{2} = 1\frac{1}{2}$
2	Find $\frac{2}{3} \div \frac{1}{3}$.	Calculation	2
3	A student writes $\frac{2}{3} \div \frac{4}{5} = \frac{3}{2} \times \frac{4}{5}$. What went wrong? Give t...	Error analysis	Only the divisor is flipped: $\frac{2}{3} \times \frac{5}{4} = \frac{10}{12} = \frac{5}{6}$
4	Find $\frac{3}{5} \div \frac{3}{10}$.	Calculation	2
5	A student writes $6 \div \frac{1}{2} = 3$ because "dividing makes smaller". Wha...	Error analysis	There are 2 halves in each of 6 wholes: $6 \times 2 = 12$
6	Find $5 \div \frac{1}{4}$.	Calculation	20

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Find 25^2 .	Calculation	625
2	Write 125% as a decimal and as a fraction in simplest form.	Calculation	1.25; $\frac{5}{4}$
3	Use a calculator. Find $\sqrt{44}$ to 1 decimal place.	Calculation	6.6
4	Find $\frac{3}{4} \times \frac{2}{5}$.	Calculation	$\frac{3}{10}$
5	A box has 21 apples and 35 pears. Write the ratio of apples to pear...	Calculation	3:5
6	Find $\frac{3}{8} \times 5$.	Calculation	$1\frac{7}{8}$
7	A \$120 item is reduced by 30%. Find the sale price.	Calculation	\$84
8	4 pens cost \$9.80. Find the cost of 10 pens.	Calculation	\$24.50

Unit 8 Multiplying and Dividing Integers

Try It

Q	Question (start)	Type	Answer or expected points
1	$3 \times (-2) = -6$, $2 \times (-2) = -4$, $1 \times (-2) = -2$, $0 \times (-2) = \underline{\quad}$.	Calculation	0
2	$(-1) \times (-2) = \underline{\quad}$. The products increase by $\underline{\quad}$ each step.	Calculation	2; 2
3	Same signs give a $\underline{\quad}$ (positive or negative) answer.	Calculation	positive
4	$(-12) \div 3 = \underline{\quad}$ because different signs give a negative.	Calculation	-4

Develop

Q	Question (start)	Type	Answer or expected points
1	Find $(-6) \times 4$.	Calculation	-24
2	Find $7 \times (-5)$.	Calculation	-35
3	Find $(-8) \times (-3)$.	Calculation	24
4	Find $(-9) \times (-9)$.	Calculation	81
5	Find $(-12) \times 5$.	Calculation	-60
6	Find $0 \times (-7)$.	Calculation	0
7	Find $36 \div (-4)$.	Calculation	-9
8	Find $(-48) \div 6$.	Calculation	-8
9	Find $(-45) \div (-9)$.	Calculation	5
10	Find $(-100) \div (-25)$.	Calculation	4
11	Find $0 \div (-3)$.	Calculation	0
12	Find $(-56) \div 7$.	Calculation	-8
13	Find $3 + (-2) \times 4$.	Calculation	-5
14	Find $(-6 + 2) \times (-3)$.	Calculation	12

Q	Question (start)	Type	Answer or expected points
15	Find $(-20) \div (-5) + 3 \times (-2)$.	Calculation	-2
16	Find $5 - (-3) \times 2$.	Calculation	11
17	Find $(-2) \times (-3) \times (-4)$.	Calculation	-24
18	Find the missing number: $(-7) \times \square = 42$.	Calculation	-6
19	Find the missing number: $\square \div (-4) = 9$.	Calculation	-36
20	Explain why the product of two negative integers is positive. Use t...	Explain	The products increase by 2 each time, so the next product is $0 + 2 = 2$. $(-1) \times (-2) = 2$, positive

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A diver descends 3 m each minute for 7 minutes. Use $(-3) \times 7$ to fin...	Calculation	-21
2	The temperature is 4°C . It drops 2°C each hour for 6 hours. What is...	Calculation	-8°C
3	A student withdraws \$15 from an account on each of 4 days. Write th...	Calculation	-60
4	A game gives 3 points for a correct answer and takes away 5 points...	Word problem	-18
5	The product of five negative integers is positive or negative? Expl...	Explain	Negative. Each pair of negatives gives a positive, and one negative is left over
6	A temperature changes by the same amount each hour for 4 hours and...	Word problem	-5°C

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student writes $(-5) \times (-6) = -30$. What went wrong? Give the corre...	Error analysis	Two negative factors give a positive product: $(-5) \times (-6) = 30$
2	Find $(-5) \times (-6)$.	Calculation	30

Q	Question (start)	Type	Answer or expected points
3	A student writes $(-24) \div (-6) = -4$. What went wrong? Give the corre...	Error analysis	Dividing two negatives gives a positive quotient: 4
4	Find $(-72) \div (-8)$.	Calculation	9
5	A student writes $5 + (-2) \times 3 = 9$ by adding first. What went wrong?...	Error analysis	Multiply first: $(-2) \times 3 = -6$, then $5 + (-6) = -1$
6	Find $4 + (-3) \times 2$.	Calculation	-2

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Find $2\frac{1}{4} \times 1\frac{2}{3}$.	Calculation	$3\frac{3}{4}$
2	Find $\frac{2}{3} \div \frac{4}{9}$.	Calculation	$1\frac{1}{2}$
3	Find 0.2% of 3000.	Calculation	6
4	Find $\sqrt{529}$.	Calculation	23
5	Estimate $\sqrt{55}$ to the nearest whole number.	Calculation	7
6	Solve: $\frac{5}{6} = \frac{x}{48}$	Calculation	40
7	Find the unit rate: 96 pages in 8 days.	Calculation	12 pages per day
8	Find $2\frac{2}{3} \div 1\frac{1}{3}$.	Calculation	2

Unit 9 Solving Problems with Positive Rational Numbers

Try It

Q	Question (start)	Type	Answer or expected points
1	Round to estimate: 6.1×3.9 is about $6 \times 4 = \underline{\hspace{1cm}}$.	Calculation	24
2	$\frac{4}{5} = 0.\underline{\hspace{1cm}}$, so $\frac{4}{5} + 0.15 = 0.8 + 0.15 = \underline{\hspace{1cm}}$.	Calculation	8; 0.95
3	$\frac{3}{4} \times 2.8 = 0.75 \times 2.8 = \underline{\hspace{1cm}}$.	Calculation	2.1
4	Is 9.6 reasonable for 4.8×0.2 ? Yes or no?	Calculation	no

Develop

Q	Question (start)	Type	Answer or expected points
1	Estimate 4.8×5.2 by rounding each number.	Calculation	About 25 (5×5)
2	Estimate $19.7 \div 4.9$ by rounding each number.	Calculation	About 4 ($20 \div 5$)
3	Is $\frac{7}{8} + \frac{11}{12}$ closer to 1 or to 2? Estimate first.	Calculation	Closer to 2 (both are close to 1)
4	Find 2.4×3.5 .	Calculation	8.4
5	Find $7.2 \div 0.9$.	Calculation	8
6	Find $\frac{7}{10} + 0.35$. Write the answer as a fraction.	Calculation	$1\frac{1}{20}$
7	Find $1.25 \times \frac{4}{5}$.	Calculation	1
8	Find $3\frac{1}{2} - 1.75$. Write the answer as a decimal.	Calculation	1.75
9	Find $\frac{2}{3}$ of 4.5.	Calculation	3
10	Find 30% of $\frac{5}{6}$.	Calculation	$\frac{1}{4}$
11	A student writes $3.2 \times 0.4 = 12.8$. Is the answer reasonable? Give t...	Calculation	No: 3×0.4 is about 1.2. $3.2 \times 0.4 = 1.28$

Q	Question (start)	Type	Answer or expected points
12	A student writes $\frac{1}{2} + \frac{1}{3} = \frac{2}{5}$. Is the answer reasonable? Give...	Calculation	No: $\frac{1}{2} + \frac{1}{3}$ is more than $\frac{1}{2}$ but $\frac{2}{5}$ is less. The sum is $\frac{5}{6}$
13	A student writes $6 \div 0.5 = 3$. Is the answer reasonable? Give the co...	Calculation	No: there are 2 halves in each whole, so $6 \div 0.5 = 12$
14	A student writes 25% of 80 = 320 (80×4). Is the answer reasonable...	Calculation	No: 25% of 80 must be less than 80. 25% of 80 = 20

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A board is 4.5 m long. $\frac{2}{5}$ of it is cut off. How many metres are c...	Calculation	1.8 m
2	Milk costs \$1.60 per litre. A family buys $2\frac{1}{2}$ L. What is the cost?	Calculation	\$4.00
3	A runner completes $\frac{3}{4}$ of a 10 km route in 40 minutes. What distan...	Word problem	7.5 km; 11.25 km/h
4	A recipe uses $\frac{3}{4}$ cup of oil. Aisha wants to make $2\frac{1}{2}$ times the...	Calculation	$1\frac{7}{8}$ cups
5	A shirt costs \$40. It is on sale for 30% off. A coupon takes off an...	Word problem	\$25.20
6	A tank holds 20 L. It is $\frac{3}{5}$ full. Then 2.5 L are added. How many...	Calculation	14.5 L

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student writes $6.5 \times 0.3 = 19.5$. What went wrong? Give the correc...	Error analysis	A reasonable estimate is $7 \times 0.3 = 2.1$. The decimal point was misplaced; $6.5 \times 0.3 = 1.95$
2	Find 2.5×0.6 .	Calculation	1.5

Q	Question (start)	Type	Answer or expected points
3	A student writes $\frac{1}{4} + \frac{1}{5} = \frac{2}{9}$. What went wrong? Give the corr...	Error analysis	Add after finding common denominators: $\frac{5}{20} + \frac{4}{20} = \frac{9}{20}$
4	Find $\frac{1}{4} + \frac{1}{3}$.	Calculation	$\frac{7}{12}$
5	A student writes $8 \div 0.25 = 2$. What went wrong? Give the correct an...	Error analysis	Dividing by a number less than 1 makes the answer larger: $8 \div 0.25 = 32$
6	Find $4 \div 0.25$.	Calculation	16

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Find $8 \div \frac{2}{5}$.	Calculation	20
2	6 pens cost \$14.40. Find the cost of 9 pens.	Calculation	\$21.60
3	Find 23^2 .	Calculation	529
4	Find $\frac{5}{6} \times \frac{3}{10}$.	Calculation	$\frac{1}{4}$
5	Find $(-84) \div 7$.	Calculation	-12
6	Between which two consecutive whole numbers is $\sqrt{99}$?	Calculation	9 and 10
7	The ratio of wins to losses is 5:4. There are 36 in all. How many w...	Calculation	20 wins; 16 losses
8	Write 0.035 as a percent.	Calculation	3.5%

Checkpoint 3

Q	Question (start)	Type	Answer or expected points
1	Find $\frac{2}{3} \times \frac{3}{8}$.	Calculation	$\frac{1}{4}$
2	Find $1\frac{1}{4} \times 2\frac{2}{5}$.	Calculation	3
3	Find $\frac{7}{8} \div \frac{1}{16}$.	Calculation	14
4	Find $3\frac{1}{3} \div \frac{5}{6}$.	Calculation	4
5	Find $(-7) \times (-4)$.	Calculation	28
6	Find $(-54) \div 9$.	Calculation	-6
7	Find $3 + (-4) \times 2$.	Calculation	-5
8	Find $\frac{3}{8}$ of 6.4.	Calculation	2.4

Ready Check 4

Q	Question (start)	Type	Answer or expected points
1	In which quadrant is $(-3, 4)$?	Calculation	Quadrant II
2	Evaluate $4x - 7$ for $x = 5$.	Calculation	13
3	What comes next: 5, 8, 11, ___?	Calculation	14
4	Solve $x + 9 = 15$.	Calculation	6
5	Solve $3x = 21$.	Calculation	7
6	Solve $x \div 4 = 9$.	Calculation	36

Unit 10 Ordered Pairs and Tables of Values

Try It

Q	Question (start)	Type	Answer or expected points
1	$y = 2x + 3$. When $x = 4$, $y = 2(4) + 3 = \underline{\hspace{1cm}}$.	Calculation	11
2	As x goes up by 1 in $y = 4x + 1$, y goes up by $\underline{\hspace{1cm}}$.	Calculation	4
3	The ordered pair for $x = 5$ and $y = 13$ is $(\underline{\hspace{1cm}}, \underline{\hspace{1cm}})$.	Calculation	5; 13
4	Number of tickets is discrete or continuous?	Calculation	discrete

Develop

Q	Question (start)	Type	Answer or expected points
1	Rule: $y = 3x - 2$. Complete the table for $x = -1, 0, 1, 2, 3$.	Calculation	-5, -2, 1, 4, 7
2	Rule: $y = 2x + 5$. Find y when $x = 0, 2, 4, 6$.	Calculation	5, 9, 13, 17
3	Rule: $y = 10 - x$. Find y when $x = 1, 4, 7, 10$.	Calculation	9, 6, 3, 0
4	The relation is $y = 2x + 1$. Write the ordered pair when $x = 4$.	Calculation	(4, 9)
5	The relation is $y = 2x + 1$. Find x when $y = 13$. Write the ordered p...	Calculation	(6, 13)
6	The relation is $y = 5x - 3$. Write the ordered pair when $x = 3$.	Calculation	(3, 12)
7	The relation is $y = 4x$. Find x when $y = -20$. Write the ordered pair.	Calculation	(-5, -20)
8	x : 1, 2, 3, 4 and y : 5, 8, 11, 14. How does y change each time x in...	Calculation	y increases by 3 each time; $y = 3x + 2$
9	x : 0, 1, 2, 3 and y : 12, 10, 8, 6. How does y change each time x in...	Calculation	y decreases by 2 each time; $y = 12 - 2x$

Q	Question (start)	Type	Answer or expected points
10	x: 2, 4, 6, 8 and y: 7, 11, 15, 19. How does y change each time x i...	Calculation	y increases by 4 when x increases by 2, so by 2 when x increases by 1; $y = 2x + 3$
11	Is this table a linear relation? x: 1, 2, 3, 4 and y: 2, 4, 8, 16....	Explain	No. y does not change by the same amount each time (+2, +4, +8)

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A movie ticket costs \$8 and there is a \$2 booking fee: $C = 8t + 2$	Calculation	$C = \$42$; $t = 7$
2	A plant is 12 cm tall and grows 3 cm each week: $h = 12 + 3w$. Find h...	Word problem	30 cm; 11 weeks
3	A taxi charges \$4 plus \$3 for each kilometre. Write a rule for the...	Word problem	$C = 3k + 4$; \$25
4	Why must the number of tickets t be a whole number? Is this relatio...	Explain	You cannot buy part of a ticket, so the data are separate values: yes, discrete
5	A pool is filled at 20 L per minute. Complete: after 1 min, 2 min,...	Calculation	20, 40, 60, 80
6	A table shows x: 1, 2, 3 and y: 5, 8, 11. Find y when $x = 10$ using...	Calculation	32 ($y = 3x + 2$)

Recalculate

Q	Question (start)	Type	Answer or expected points
1	For $y = 2x - 1$, a student writes the ordered pair for $x = 3$ as (5,...	Error analysis	The x-value comes first. When $x = 3$, $y = 2(3) - 1 = 5$, so the pair is (3, 5)
2	Write the ordered pair for $y = 2x - 1$ when $x = 4$.	Calculation	(4, 7)
3	For $y = 3x + 1$, a student completes $x = 0, 1, 2$ with $y = 1, 4, 6$. W...	Error analysis	y goes up by 3 each time, not by 2. $y = 3(2) + 1 = 7$
4	For $y = 2x + 5$ find y when $x = 3$.	Calculation	11

Q	Question (start)	Type	Answer or expected points
5	Pairs (1, 4) and (2, 7). A student says the rule is $y = x + 3$. What...	Error analysis	$y = x + 3$ gives 5 for $x = 2$, not 7. y increases by 3 each time, so $y = 3x + 1$
6	x : 1, 2, 3 and y : 5, 7, 9. Find the rule.	Calculation	$y = 2x + 3$

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Write 0.3% as a decimal and as a fraction in simplest form.	Calculation	0.003; $\frac{3}{1000}$
2	A box has 18 wins and 45 losses. Write the ratio of wins to losses...	Calculation	2:5
3	Find 3.6×2.5 .	Calculation	9
4	Find $(-9) \times 6$.	Calculation	-54
5	Increase 250 by 12%.	Calculation	280
6	Use a calculator. Find $\sqrt{95}$ to 1 decimal place.	Calculation	9.7
7	Find $\frac{5}{6} \times 11$.	Calculation	$9\frac{1}{6}$
8	Find $\frac{5}{8} \div \frac{3}{4}$.	Calculation	$\frac{5}{6}$

Unit 11 Graphing Linear Relations

Try It

Q	Question (start)	Type	Answer or expected points
1	$y = x + 2$. When $x = 3$, $y = \underline{\quad}$. The point is $(3, \underline{\quad})$.	Calculation	5; 5
2	To plot $(2, 4)$, go $\underline{\quad}$ right and $\underline{\quad}$ up.	Drawing or graph	2; 4
3	The points $(0, 2)$, $(1, 6)$, $(2, 10)$ go up by $\underline{\quad}$ each time.	Calculation	4
4	The rule for those points is $y = \underline{\quad}x + 2$.	Calculation	4

Develop

Q	Question (start)	Type	Answer or expected points
1	Complete the table for $y = x + 2$ for $x = 0, 1, 2, 3, 4, 5$ and plot...	Drawing or graph	2, 3, 4, 5, 6, 7
2	Complete the table for $y = 2x$ for $x = 0, 1, 2, 3, 4, 5$ and plot the...	Drawing or graph	0, 2, 4, 6, 8, 10
3	The graph shows points of a relation. List the ordered pairs.	Calculation	$(0, 2)$, $(1, 5)$, $(2, 8)$, $(3, 11)$
4	Use the graph above. By how much does y increase when x increases b...	Calculation	y increases by 3; $y = 3x + 2$
5	Use the rule to find y when $x = 6$.	Calculation	20
6	The graph shows points that go down. List the ordered pairs and wri...	Calculation	$(0, 12)$, $(1, 9)$, $(2, 6)$, $(3, 3)$, $(4, 0)$; $y = 12 - 3x$
7	In the graph above, x is the number of sales of 3 tickets each and...	Explain	Discrete: x counts whole sales, so the points are not joined
8	Does the point $(6, 16)$ lie on the relation $y = 3x - 1$? Show why or...	Explain	No. When $x = 6$, $y = 3(6) - 1 = 17$, not 16
9	Does the point $(3, 11)$ lie on $y = 4x - 1$? Show why or why not.	Explain	Yes. When $x = 3$, $y = 4(3) - 1 = 11$

Q	Question (start)	Type	Answer or expected points
10	A point on $y = 3x - 1$ has $x = 5$. Find y .	Calculation	14
11	Find the missing value so that $(6, ?)$ is on $y = 4x - 5$.	Calculation	19

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A pizza shop charges \$3 per slice. The graph shows the cost for 1 t...	Word problem	$C = 3s$; \$27
2	A relation has the points $(1, 4)$, $(2, 6)$, $(3, 8)$. Write the rule. F...	Calculation	$y = 2x + 2$; 22
3	A savings plan: start with \$10 and add \$5 each week. Write a rule,...	Word problem	$S = 10 + 5w$; 10, 15, 20, 25, 30; points in a straight line going up
4	Alex plots $(2, 5)$ as 5 right and 2 up. What error did Alex make? Wh...	Calculation	Alex reversed x and y . $(2, 5)$ is 2 right and 5 up
5	The points $(0, 1)$, $(1, 3)$, $(2, 5)$, $(3, 8)$ are plotted. Which point...	Word problem	$(3, 8)$; y should be 7
6	Why do points of a linear relation fall in a straight line? Use the...	Explain	y changes by the same amount each time x changes by 1, so each step moves the same distance up (or down) and right

Recalculate

Q	Question (start)	Type	Answer or expected points
1	For $y = x + 2$, a student plots $(3, 5)$ as 3 up and 5 right. What wen...	Error analysis	The x -value (3) is how far right and the y -value (5) is how far up. Plot 3 right, 5 up
2	Plot $(3, 5)$: how many units right and how many up?	Drawing or graph	3 right and 5 up
3	The points $(0, 2)$, $(1, 5)$, $(2, 8)$ are plotted. A student writes the...	Error analysis	$y = x + 2$ gives 3 when $x = 1$, not 5. y goes up by 3 each time: $y = 3x + 2$
4	Points $(0, 3)$, $(1, 6)$, $(2, 9)$. Write the rule.	Calculation	$y = 3x + 3$

Q	Question (start)	Type	Answer or expected points
5	A student says $(4, 11)$ is on $y = 3x - 2$ because $3 \times 4 - 1 = 11$. Wha...	Error analysis	The rule is $3x - 2$, not $3x - 1$. $y = 3(4) - 2 = 10$
6	Is $(3, 7)$ on $y = 2x + 1$?	Calculation	Yes: $2(3) + 1 = 7$

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Find $3\frac{1}{2} \div 1\frac{3}{4}$.	Calculation	2
2	Find 175% of 60.	Calculation	105
3	Find the unit rate: 45 L in 6 minutes.	Calculation	7.5 L per minute
4	The relation is $y = 3x + 4$. Find x when $y = 25$. Write the ordered p...	Calculation	$(7, 25)$
5	Find $1\frac{3}{5} \times 2\frac{1}{4}$.	Calculation	$3\frac{3}{5}$
6	Find $\frac{3}{4}$ of 6.8.	Calculation	5.1
7	Solve: $\frac{7}{9} = \frac{x}{54}$	Calculation	42
8	Find $5 + (-3) \times 4$.	Calculation	-7

Unit 12 Solving One-Step and Two-Step Equations

Try It

Q	Question (start)	Type	Answer or expected points
1	$3x + 2 = 14$. Subtract $__$ from both sides: $3x = __$.	Calculation	2; 12
2	$3x = 12$. Divide both sides by $__$: $x = __$.	Calculation	3; 4
3	Check: $3(4) + 2 = __$. Is it equal to 14?	Calculation	14
4	$x \div 3 = -5$. Multiply both sides by 3: $x = __$.	Calculation	-15

Develop

Q	Question (start)	Type	Answer or expected points
1	Solve $4x = -28$. Check your answer.	Calculation	-7
2	Solve $-5x = 45$. Check your answer.	Calculation	-9
3	Solve $7x = 63$. Check your answer.	Calculation	9
4	Solve $-3x = -27$. Check your answer.	Calculation	9
5	Solve $x \div 4 = -6$. Check your answer.	Calculation	-24
6	Solve $x \div (-3) = 5$. Check your answer.	Calculation	-15
7	Solve $x \div 7 = 8$. Check your answer.	Calculation	56
8	Solve $x \div (-2) = -9$. Check your answer.	Calculation	18
9	Solve $3x + 4 = 19$. Check your answer.	Calculation	5
10	Solve $2x - 7 = 9$. Check your answer.	Calculation	8
11	Solve $-2x + 6 = -10$. Check your answer.	Calculation	8
12	Solve $5x + 12 = -3$. Check your answer.	Calculation	-3
13	Solve $-4x - 5 = 11$. Check your answer.	Calculation	-4
14	Solve $6x - 8 = 22$. Check your answer.	Calculation	5
15	Is $x = -4$ a solution of $3x + 5 = -7$? Substitute to check.	Calculation	Yes. $3(-4) + 5 = -12 + 5 = -7$

Q	Question (start)	Type	Answer or expected points
16	Is $x = 6$ a solution of $2x - 3 = 10$? Substitute to check.	Calculation	No. $2(6) - 3 = 9$, not 10
17	Draw a balance picture for $4x + 1 = 13$ and use it to solve.	Drawing or graph	Remove 1 from both sides: $4x = 12$. Split into 4 equal groups: $x = 3$

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A taxi charges \$4 plus \$3 per kilometre. A trip costs \$22. Write an...	Calculation	$3k + 4 = 22$; $k = 6$ km
2	I think of a number, multiply it by 5 and subtract 8. The result is...	Calculation	$5n - 8 = 27$; $n = 7$
3	A phone plan costs \$15 plus \$2 for each gigabyte. The bill is \$39....	Word problem	$2g + 15 = 39$; $g = 12$
4	The temperature starts at 6°C and falls 3°C each hour. After how ma...	Calculation	$-3h + 6 = -9$; $h = 5$ hours
5	Four friends share a bill equally and each pays \$15. Write an equat...	Calculation	$b \div 4 = 15$; $b = \$60$
6	A student solves $5x - 3 = 22$ and gets $x = 5$. Show how to check usin...	Calculation	$5(5) - 3 = 25 - 3 = 22$, so $x = 5$ is correct

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student solves $4x + 5 = 29$ and writes $4x = 34$. What went wrong? G...	Error analysis	Subtract 5 from both sides, not add: $4x = 24$, so $x = 6$
2	Solve $2x + 7 = 21$.	Calculation	7
3	A student solves $2x + 6 = 14$ by dividing only the first term: $x + 6$...	Error analysis	Undo +6 first: $2x = 8$, then $x = 4$. Or divide every term by 2: $x + 3 = 7$
4	Solve $4x + 8 = 28$.	Calculation	5
5	A student solves $-2x = 10$ and writes $x = 5$. What went wrong? Give t...	Error analysis	Divide by -2 : $x = 10 \div (-2) = -5$. Check: $-2(-5) = 10$

Q	Question (start)	Type	Answer or expected points
6	Solve $-5x = 35$.	Calculation	-7

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Find $5 \div \frac{5}{6}$.	Calculation	6
2	8 pens cost \$10.00. Find the cost of 20 pens.	Calculation	\$25.00
3	The ratio of red to green is 4:9. There are 52 in all. How many red...	Calculation	16 red; 36 green
4	Find $\frac{7}{8} \times \frac{4}{21}$.	Calculation	$\frac{1}{6}$
5	The relation is $y = 4x + 3$. Write the ordered pair when $x = 6$.	Calculation	(6, 27)
6	Find the missing value so that (7, ?) is on $y = 5x - 4$.	Calculation	31
7	Find $54 \div (-6)$.	Calculation	-9
8	Find $\frac{1}{4} + 0.5$. Write the answer as a fraction.	Calculation	$\frac{3}{4}$

Unit 13 Equations with Division and Brackets

Try It

Q	Question (start)	Type	Answer or expected points
1	$x \div 3 + 2 = 6$. Subtract 2: $x \div 3 = \underline{\quad}$. Multiply by 3: $x = \underline{\quad}$.	Calculation	4; 12
2	$3(x + 2) = 21$. Divide both sides by 3: $x + 2 = \underline{\quad}$. So $x = \underline{\quad}$.	Calculation	7; 5
3	Distribute: $3(x + 2) = 3x + \underline{\quad}$.	Calculation	6
4	Check $x = 5$ in $3(x + 2)$: $3(5 + 2) = \underline{\quad}$.	Calculation	21

Develop

Q	Question (start)	Type	Answer or expected points
1	Solve $x \div 5 + 4 = 9$. Check your answer.	Calculation	25
2	Solve $x \div (-2) + 5 = 1$. Check your answer.	Calculation	8
3	Solve $x \div 3 - 4 = 2$. Check your answer.	Calculation	18
4	Solve $x \div 5 + 6 = 2$. Check your answer.	Calculation	-20
5	Solve $x \div (-3) - 2 = -5$. Check your answer.	Calculation	9
6	Solve $2(x + 3) = 14$. Check your answer.	Calculation	4
7	Solve $3(x - 2) = 15$. Check your answer.	Calculation	7
8	Solve $(-4)(x + 1) = 12$. Check your answer.	Calculation	-4
9	Solve $5(x + 2) = -20$. Check your answer.	Calculation	-6
10	Solve $(-3)(x - 4) = -15$. Check your answer.	Calculation	9
11	Solve $4(x - 5) = -8$. Check your answer.	Calculation	3
12	Solve $6(x + 1) = 30$ by dividing both sides by 6 first. Then solve i...	Word problem	Divide first: $x + 1 = 5$, so $x = 4$. Distribute: $6x + 6 = 30$, $6x = 24$, $x = 4$. Same answer
13	Use the distributive property to write $4(x - 3) = 20$ as an equation...	Calculation	$4x - 12 = 20$; $4x = 32$; $x = 8$

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	Three friends each pay \$x plus a \$2 fee, and the total is \$24. Writ...	Calculation	$3(x + 2) = 24$; $x = 6$
2	A rectangle has width 2 m and length (x + 3) m. Its area is 18 m ²	Calculation	$2(x + 3) = 18$; $x = 6$
3	A number divided by 5, plus 2, is 6. Write an equation and find the...	Calculation	$x \div 5 + 2 = 6$; $x = 20$
4	A club splits a prize equally among 4 members. Each gets $\$x \div 4$ and...	Word problem	$x \div 4 + 10 = 35$; $x = 100$
5	Check $x = 7$ for $3(x - 2) = 15$ by substituting.	Calculation	$3(7 - 2) = 3(5) = 15$. ✓
6	Solve $5(x + 1) = 35$ two ways: divide both sides by 5 first, and use...	Word problem	Divide first: $x + 1 = 7$, $x = 6$. Distribute: $5x + 5 = 35$, $5x = 30$, $x = 6$. Yes, the same

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student solves $3(x + 2) = 18$ and writes $3x + 2 = 18$. What went wr...	Error analysis	The 3 multiplies both terms: $3x + 6 = 18$, so $3x = 12$ and $x = 4$
2	Solve $3(x + 1) = 18$.	Calculation	5
3	A student solves $x \div 6 + 2 = 5$ and writes $x + 2 = 30$. What went wro...	Error analysis	Undo + 2 first: $x \div 6 = 3$, then multiply by 6: $x = 18$
4	Solve $x \div 7 + 2 = 6$.	Calculation	28
5	A student solves $4(x - 2) = 12$ by writing $x - 2 = 3$ and then $x = 1$	Error analysis	Undo - 2 by adding 2: $x = 3 + 2 = 5$. Check: $4(5 - 2) = 12$
6	Solve $2(x - 5) = 6$.	Calculation	8

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Find $7 \times (-8)$.	Calculation	-56
2	Find 4.2×1.5 .	Calculation	6.3
3	The relation is $y = 5x - 2$. Find x when $y = 33$. Write the ordered p...	Calculation	(7, 33)
4	Solve $x \div 5 = -7$. Check your answer.	Calculation	-35
5	Does the point (4, 15) lie on the relation $y = 3x + 3$? Show why or...	Explain	Yes. When $x = 4$, $y = 3(4) + 3 = 15$
6	Find $\frac{7}{10} \times 4$.	Calculation	$2\frac{4}{5}$
7	Find $\frac{7}{10} \div \frac{2}{5}$.	Calculation	$1\frac{3}{4}$
8	A \$45 item is reduced by 20%. Find the sale price.	Calculation	\$36

Checkpoint 4

Q	Question (start)	Type	Answer or expected points
1	For $y = 3x + 2$, find y when $x = 5$.	Calculation	17
2	x : 1, 2, 3 and y : 7, 10, 13. Write the rule.	Calculation	$y = 3x + 4$
3	Is (5, 11) on the relation $y = 3x - 4$? Show why.	Explain	Yes: $3(5) - 4 = 11$
4	Solve $-4x = 36$.	Calculation	-9
5	Solve $3x - 8 = 13$.	Calculation	7
6	Solve $x \div 3 + 5 = 9$.	Calculation	12
7	Solve $4(x - 1) = 20$.	Calculation	6
8	A taxi charges \$6 plus \$5 per kilometre. A trip costs \$41. Write an...	Calculation	$5k + 6 = 41$; $k = 7$ km

Ready Check 5

Q	Question (start)	Type	Answer or expected points
1	Find the area of a rectangle 7 cm by 4 cm.	Calculation	28 cm^2
2	Find the area of a triangle with base 10 cm and height 6 cm.	Calculation	30 cm^2
3	Find the circumference of a circle with diameter 10 cm. Use $\pi \approx 3.14$.	Calculation	31.4 cm
4	Find the area of a circle with radius 3 cm. Use $\pi \approx 3.14$ and round...	Calculation	28.3 cm^2
5	Two angles of a triangle are 50° and 60° . Find the third angle.	Calculation	70°
6	Reflect the point $(-3, 5)$ in the y-axis. Write the image.	Calculation	(3, 5)

Unit 14 The Pythagorean Theorem

Try It

Q	Question (start)	Type	Answer or expected points
1	Legs 10 and 24: $10^2 + 24^2 = _ + _ = _$.	Calculation	100; 576; 676
2	$c^2 = 676$, so $c = \sqrt{676} = _$.	Calculation	26
3	Hypotenuse 17, leg 15: $17^2 - 15^2 = _ - _ = _$.	Calculation	289; 225; 64
4	Is 11, 60, 61 a triple? $11^2 + 60^2 = _$ and $61^2 = _$.	Calculation	3721; 3721

Develop

Q	Question (start)	Type	Answer or expected points
1	Find the hypotenuse c .	Calculation	10
2	A right triangle has legs 5 and 12. Find the hypotenuse. If it is n ...	Word problem	13
3	A right triangle has legs 9 and 12. Find the hypotenuse. If it is n ...	Word problem	15
4	A right triangle has legs 7 and 24. Find the hypotenuse. If it is n ...	Word problem	25
5	A right triangle has legs 4 and 7. Find the hypotenuse. If it is n ...	Calculation	$\sqrt{65} \approx 8.1$
6	A right triangle has legs 2 and 5. Find the hypotenuse. If it is n ...	Calculation	$\sqrt{29} \approx 5.4$
7	Find the unknown leg a .	Calculation	5
8	A right triangle has hypotenuse 17 and one leg 8. Find the other leg...	Word problem	15
9	A right triangle has hypotenuse 10 and one leg 6. Find the other leg...	Word problem	8
10	A right triangle has hypotenuse 13 and one leg 5. Find the other leg...	Word problem	12

Q	Question (start)	Type	Answer or expected points
11	A right triangle has hypotenuse 9 and one leg 6. Find the other leg...	Word problem	$\sqrt{45} \approx 6.7$
12	Is a triangle with sides 8, 15 and 17 a right triangle? Show $a^2 + b^2$...	Calculation	Yes: $8^2 + 15^2 = 289$ and $17^2 = 289$
13	Is a triangle with sides 6, 8 and 11 a right triangle? Show $a^2 + b^2$...	Calculation	No: $6^2 + 8^2 = 100$ and $11^2 = 121$
14	Is a triangle with sides 12, 16 and 20 a right triangle? Show $a^2 +$...	Calculation	Yes: $12^2 + 16^2 = 400$ and $20^2 = 400$
15	Is a triangle with sides 7, 10 and 12 a right triangle? Show $a^2 + b^2$...	Calculation	No: $7^2 + 10^2 = 149$ and $12^2 = 144$
16	Explain why the Pythagorean theorem is only used for right triangles.	Explain	The theorem $a^2 + b^2 = c^2$ describes the areas of squares on the sides of a right triangle. Other triangles do not have that relationship

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A 5 m ladder leans against a wall. The foot of the ladder is 1.5 m...	Word problem	4.8 m
2	A TV screen is 24 cm wide and 18 cm tall. Find the length of its di...	Calculation	30 cm
3	A baseball diamond is a square with sides 27 m. Find the distance f...	Word problem	38.2 m
4	A rectangular field is 100 m by 60 m. Find the length of the diagon...	Calculation	116.6 m
5	A carpenter checks a corner by measuring 3 ft along one edge, 4 ft...	Explain	Yes: $3^2 + 4^2 = 25 = 5^2$, so the angle is a right angle
6	Two hikers start at the same point. One walks 8 km north and the ot...	Word problem	17 km

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student finds the hypotenuse for legs 6 and 8 and writes $c = 6^2 + \dots$	Error analysis	100 is c^2 , not c . $c = \sqrt{100} = 10$
2	Legs are 9 and 12. Find the hypotenuse.	Calculation	15
3	A student finds the hypotenuse for legs 3 and 4 and writes $c^2 = 4^2 \dots$	Error analysis	To find the hypotenuse, add the squares: $9 + 16 = 25$, so $c = 5$
4	Legs are 16 and 30. Find the hypotenuse.	Calculation	34
5	A student says a triangle with sides 7, 10 and 12 is a right triang...	Error analysis	The two numbers must be equal. $149 \neq 144$, so it is not a right triangle
6	Is a triangle with sides 8, 15 and 17 a right triangle?	Calculation	Yes: $64 + 225 = 289 = 17^2$

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Find $1\frac{3}{4} \div 2\frac{1}{2}$.	Calculation	$\frac{7}{10}$
2	Solve $3(x + 4) = 27$. Check your answer.	Calculation	5
3	Find $\frac{5}{6}$ of 7.2.	Calculation	6
4	Find $(-7) + 2 \times (-6)$.	Calculation	-19
5	Solve $8x = -56$. Check your answer.	Calculation	-7
6	Find $3\frac{1}{3} \times 1\frac{1}{5}$.	Calculation	4
7	Find the missing value so that $(-2, ?)$ is on $y = 3x + 6$.	Calculation	0
8	The relation is $y = 3x - 2$. Write the ordered pair when $x = 7$.	Calculation	(7, 19)

Unit 15 Nets of 3-D Objects

Try It

Q	Question (start)	Type	Answer or expected points
1	A cube has __ square faces.	Calculation	6
2	A triangular prism net has __ triangles and __ rectangles.	Calculation	2; 3
3	A rectangular prism 5 by 2 by 3 has two 5 × 3 faces with area __ each.	Calculation	15
4	The rectangle in a cylinder net has length equal to the __ of the c...	Calculation	circumference

Develop

Q	Question (start)	Type	Answer or expected points
1	Which solid does this net fold into? (Net 1)	Calculation	Rectangular prism
2	Which solid does this net fold into? (Net 2)	Calculation	Triangular prism
3	Which solid does this net fold into? (Net 3)	Calculation	Cylinder
4	Which solid does this net fold into? (Net 4)	Calculation	Cube
5	How many faces does a cube have? A rectangular prism?	Calculation	6; 6
6	How many faces does a triangular prism have? Name their shapes.	Calculation	5: 2 triangles and 3 rectangles
7	A cylinder net has how many parts? Name their shapes.	Calculation	3: 2 circles and 1 rectangle
8	Does Net A fold into a cube? Explain.	Explain	Yes. One square above and one below the row of four fold to the top and bottom, with no overlap
9	Does Net B fold into a cube? Explain.	Explain	No. The two squares above the row both fold to the same face (overlap), so one face is missing

Q	Question (start)	Type	Answer or expected points
10	Does Net C fold into a cube? Explain.	Explain	No. A 2 by 3 block cannot fold into a cube; faces overlap
11	A cube has edge 3 cm. Find the total area of its net.	Calculation	54 cm^2
12	A rectangular prism is 8 cm by 3 cm by 2 cm. Find the area of its net.	Calculation	92 cm^2
13	A cylinder has radius 2 cm and height 5 cm. The rectangle in its ne...	Word problem	12.6 cm ($2 \times 3.14 \times 2 = 12.56$)
14	Draw a net of a rectangular prism 6 cm by 2 cm by 2 cm in the work...	Drawing or graph	Six rectangles: four 6×2 and two 2×2 , arranged so they fold with no overlap

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A gift box is 20 cm by 15 cm by 10 cm. Find the area of the net (wi...	Calculation	1300 cm^2
2	A can has radius 3 cm and height 10 cm. The label wraps once around...	Word problem	188.4 cm^2
3	Sam says any six squares joined edge to edge fold into a cube. Draw...	Drawing or graph	Any 2 by 3 block of squares (like Net C) does not fold into a cube
4	A net has 2 triangles and 3 rectangles. Which solid is it?	Calculation	A triangular prism
5	A cereal box is 20 cm wide, 8 cm deep and 30 cm tall. Which two fac...	Word problem	The front and back: $20 \text{ cm} \times 30 \text{ cm}$
6	Why must the rectangle in a cylinder net be as long as the circumfe...	Explain	The rectangle wraps once around the circle, so its length equals the distance around the circle

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student says a triangular prism net has only 3 faces because it h...	Error analysis	The two triangular ends are faces too: 3 rectangles + 2 triangles = 5 faces
2	How many faces does a cube net have?	Calculation	6
3	A student says the rectangle in the cylinder net ($r = 4$ cm) has len...	Error analysis	The length equals the circumference: $2 \times 3.14 \times 4 = 25.12$, so 25.1 cm
4	Find the circumference of a circle with radius 1 cm ($\pi \approx 3.14$, near...	Calculation	6.3 cm (6.28 before rounding)
5	A student says a 2 by 3 block of six squares folds into a cube. Wha...	Error analysis	Some faces would overlap and some would be missing. It is not a cube net
6	A net has a column of four squares. One square is attached to the l...	Word problem	Yes

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Find $(-81) \div (-9)$.	Calculation	9
2	Solve $5x + 3 = 38$. Check your answer.	Calculation	7
3	Is a triangle with sides 7, 24 and 25 a right triangle? Show $a^2 + b...$	Calculation	Yes: $7^2 + 24^2 = 625$ and $25^2 = 625$
4	Does the point (6, 20) lie on the relation $y = 4x - 3$? Show why or...	Explain	No. When $x = 6$, $y = 4(6) - 3 = 21$, not 20
5	Find $9 \div \frac{3}{4}$.	Calculation	12
6	Find $\frac{2}{5} + 0.35$. Write the answer as a fraction.	Calculation	$\frac{3}{4}$
7	Solve $x \div 5 + 3 = 9$. Check your answer.	Calculation	30
8	The relation is $y = 4x + 7$. Find x when $y = 31$. Write the ordered p...	Calculation	(6, 31)

Unit 16 Surface Area

Try It

Q	Question (start)	Type	Answer or expected points
1	A 7 by 2 by 3 prism has 3 pairs of faces. $2(14) + 2(21) + 2(6) = \underline{\hspace{1cm}}$	Calculation	28; 42; 12; 82
2	A triangle with base 10 and height 24 has area $\underline{\hspace{1cm}}$. Two of them: $\underline{\hspace{1cm}}$.	Calculation	120; 240
3	The curved part of a cylinder unrolls into a rectangle of length $2\pi\ldots$	Calculation	h
4	For $r = 3$: $2 \times 3.14 \times 3^2 = \underline{\hspace{1cm}}$.	Calculation	56.52

Develop

Q	Question (start)	Type	Answer or expected points
1	Find the surface area of a rectangular prism 6 cm by 5 cm by 4 cm.	Calculation	148 cm^2
2	Find the surface area of a rectangular prism 8 cm by 4 cm by 6 cm.	Calculation	208 cm^2
3	Find the surface area of a rectangular prism 10 cm by 2.5 cm by 4 cm.	Calculation	150 cm^2
4	Find the surface area of a cube with edge 7 cm.	Calculation	294 cm^2
5	A right triangular prism has a right-triangle base with sides 7, 24...	Word problem	728 cm^2
6	A right triangular prism has a right-triangle base with sides 5, 12...	Word problem	300 cm^2
7	A right triangular prism has a right-triangle base with sides 6, 8...	Word problem	168 cm^2
8	A cylinder has radius 3 cm and height 10 cm. Find its surface area.	Calculation	244.9 cm^2
9	A cylinder has radius 5 cm and height 12 cm. Find its surface area.	Calculation	533.8 cm^2

Q	Question (start)	Type	Answer or expected points
10	A cylinder has radius 2 cm and height 7 cm. Find its surface area.	Calculation	113.0 cm^2
11	Explain how the net of a cylinder helps you find its surface area.	Explain	The net has two circles ($2\pi r^2$ together) and a rectangle with length $2\pi r$ and width h ($2\pi rh$). Adding their areas gives the surface area

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	An open aquarium (no top) is 50 cm long, 30 cm wide and 40 cm tall....	Calculation	7900 cm^2
2	A cube-shaped box has edge 6 cm. A rectangular box is 4 cm by 5 cm...	Word problem	The cube: 216 cm^2 vs 184 cm^2 ; the cube uses 32 cm^2 more
3	An open can (no lid) has radius 4 cm and height 10 cm. Find the are...	Word problem	301.4 cm^2
4	A gift box is 30 cm by 20 cm by 10 cm. Find the area of paper neede...	Calculation	2200 cm^2
5	A right triangular prism has a right-triangle base with sides 5, 12...	Word problem	300 cm^2
6	A room is 4 m by 3 m and 2.5 m high. The four walls and the ceiling...	Word problem	47 m^2 ; 4 cans ($47 \div 12$ is about 3.9)

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student finds the surface area of a 6 by 4 by 3 prism as $6 \times 4 + 6 \times \dots$	Error analysis	There are 6 faces in 3 matching pairs. Double the sum: $2(24 + 18 + 12) = 108 \text{ cm}^2$
2	Find the surface area of a 7 cm by 5 cm by 3 cm prism.	Calculation	142 cm^2

Q	Question (start)	Type	Answer or expected points
3	A student finds the surface area of a cylinder ($r = 5$ cm, $h = 8$ cm)...	Error analysis	That is only the curved part. Add the two circles: $2 \times 3.14 \times 5^2 = 157$. Total 408.2 cm^2
4	Find the surface area of a cylinder with $r = 2$ cm and $h = 7$ cm ($\pi \approx \dots$)	Calculation	113.0 cm^2
5	A student finds the surface area of a triangular prism (base 9, 12, ...)	Error analysis	There are two triangular ends: $2 \times 54 = 108$. $108 + 216 = 324 \text{ cm}^2$
6	Find the surface area of a triangular prism with base 8, 15, 17 cm...	Calculation	360 cm^2

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	A right triangle has legs 8 and 15. Find the hypotenuse. If it is n ...	Word problem	17
2	Solve $5(x - 2) = 40$. Check your answer.	Calculation	10
3	Solve $x \div 6 = 8$. Check your answer.	Calculation	48
4	Find $(-11) \times (-4)$.	Calculation	44
5	The relation is $y = 5x + 1$. Write the ordered pair when $x = -3$.	Calculation	$(-3, -14)$
6	Find 6.4×0.25 .	Calculation	1.6
7	Find the missing value so that $(9, ?)$ is on $y = 2x - 1$.	Calculation	17
8	A cube has edge 4 cm. Find the total area of its net.	Calculation	96 cm^2

Unit 17 Volume of Prisms and Cylinders

Try It

Q	Question (start)	Type	Answer or expected points
1	A 5 by 4 by 3 prism has base area $5 \times 4 = \underline{\hspace{1cm}}$ cm^2 .	Calculation	20
2	$V = B \times h = 20 \times 3 = \underline{\hspace{1cm}}$ cm^3 .	Calculation	60
3	A right-triangle base with legs 9 and 12 has area $(9 \times 12) \div 2 = \underline{\hspace{1cm}}$...	Calculation	54
4	A cylinder base with $r = 5$ has area $3.14 \times 5^2 = \underline{\hspace{1cm}}$ cm^2 .	Calculation	78.5

Develop

Q	Question (start)	Type	Answer or expected points
1	Find the volume of a rectangular prism 9 cm by 3 cm by 4 cm.	Calculation	108 cm^3
2	Find the volume of a cube with edge 5 cm.	Calculation	125 cm^3
3	Find the volume of a rectangular prism 12 cm by 5 cm by 3 cm.	Calculation	180 cm^3
4	The base area of a prism is 24 cm^2 and its height is 9 cm. Find the...	Calculation	216 cm^3
5	The base area of a prism is 36 cm^2 and its height is 5 cm. Find the...	Calculation	180 cm^3
6	A prism has a right-triangle base with legs 6 cm and 8 cm and lengt...	Calculation	288 cm^3
7	A prism has a right-triangle base with legs 5 cm and 12 cm and leng...	Calculation	210 cm^3
8	A cylinder has radius 4 cm and height 10 cm. Find its volume.	Calculation	502.4 cm^3
9	A cylinder has radius 5 cm and height 7 cm. Find its volume.	Calculation	549.5 cm^3

Q	Question (start)	Type	Answer or expected points
10	A cylinder has radius 3 cm and height 8 cm. Find its volume.	Calculation	226.1 cm^3
11	A prism measures 2 cm by 3 cm by 10 cm. Does its volume change if i...	Explain	No. The volume is 60 cm^3 in every position. Only the base and height swap
12	An aquarium is 50 cm by 30 cm by 40 cm. Find its volume in cm^3 and...	Calculation	60000 cm^3 ; 60 L

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A can has radius 3 cm and height 10 cm. A box has a square base 6 c...	Word problem	Can 282.6 cm^3 ; box 288 cm^3 ; the box holds 5.4 cm^3 more
2	A pool is 8 m long, 5 m wide and 1.5 m deep. Find its volume.	Calculation	60 m^3
3	A soup can has radius 4 cm and height 11 cm. Find its volume in cm^3 ...	Word problem	552.6 cm^3 ; 552.6 mL
4	A wooden wedge is a triangular prism with a right-triangle base wit...	Word problem	60 cm^3
5	A rectangular tank 40 cm by 25 cm is filled to a depth of 12 cm. Ho...	Calculation	$12000 \text{ cm}^3 = 12 \text{ L}$
6	Explain why volume is measured in cubic units but surface area in s...	Explain	Volume counts unit cubes that fill the object (3 dimensions). Surface area counts unit squares that cover it (2 dimensions)

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student finds the volume of a 5 by 3 by 2 prism as $5 + 3 + 2 = 10$...	Error analysis	Volume multiplies the three dimensions: $5 \times 3 \times 2 = 30 \text{ cm}^3$
2	Find the volume of a 4 cm by 3 cm by 2 cm prism.	Calculation	24 cm^3

Q	Question (start)	Type	Answer or expected points
3	A student writes the volume of a prism as 60 cm^2 . What went wrong?...	Error analysis	Volume is measured in cubic units: 60 cm^3
4	A cube has edge 3 cm. Find its volume with units.	Calculation	27 cm^3
5	A cylinder has diameter 6 cm and height 10 cm. A student uses 3.14...	Error analysis	The formula needs the radius, which is half the diameter: $r = 3$. $3.14 \times 3^2 \times 10 = 282.6 \text{ cm}^3$
6	A cylinder has diameter 8 cm and height 5 cm. Find the volume ($\pi \approx \dots$)	Calculation	251.2 cm^3

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Find the surface area of a cube with edge 4 cm.	Calculation	96 cm^2
2	Solve $x \div 4 - 2 = 3$. Check your answer.	Calculation	20
3	A cylinder has radius 3 cm and height 8 cm. The rectangle in its ne...	Word problem	18.84 cm
4	A right triangle has hypotenuse 25 and one leg 24. Find the other l...	Word problem	7
5	Solve $9x = 63$. Check your answer.	Calculation	7
6	The relation is $y = 2x - 9$. Find x when y = 11. Write the ordered p...	Calculation	(10, 11)
7	Find $\frac{2}{9}$ of 4.5.	Calculation	1
8	Does the point (3, 8) lie on the relation $y = 2x + 1$? Show why or w...	Explain	No. When $x = 3$, $y = 2(3) + 1 = 7$, not 8

Unit 18 Top, Front and Side Views

Try It

Q	Question (start)	Type	Answer or expected points
1	Stack heights 2, 0, 1 / 1, 2, 2 / 0, 1, 3. Add them: total = __ cubes.	Calculation	12
2	Column 1 has stacks 3, 0, 2. The tallest is __, so the front view s...	Calculation	3; 3
3	The front row is 2, 0, 1. The tallest is __ so the right view start...	Calculation	2; 2
4	After a 90° turn, the number of cubes is __ (same or different).	Calculation	same

Develop

Q	Question (start)	Type	Answer or expected points
1	How many cubes are in Structure P? Every number is the height of th...	Calculation	13
2	How many cubes are in Structure Q?	Calculation	6
3	Structure P. The front view shows the tallest stack in each column,...	Word problem	2, 3, 2
4	Structure P. Look from the right side. The front of the structure i...	Word problem	2, 3, 1
5	Structure Q. Give the front view as three heights.	Calculation	1, 2, 1
6	Structure Q. Give the right view as three heights (front on the left).	Calculation	2, 1, 1
7	Structure P. How many squares can you see in the top view?	Calculation	8
8	Rotate Structure P a quarter turn (90°) clockwise as seen from abov...	Word problem	1, 2, 1; 2, 3, 1; 2, 1, 0
9	Use your answer above. Give the new front view of Structure P after...	Calculation	2, 3, 1

Q	Question (start)	Type	Answer or expected points
10	Does rotating a structure change the number of cubes? Explain.	Explain	No. Turning the structure moves the cubes but none are added or removed
11	A structure fits in a 3 by 3 grid. Its front view is 2, 3, 2 and it...	Word problem	Fewest 8; most 16
12	Sketch the top, front and right views of 4 cubes lying flat on the...	Drawing or graph	Check: top view is an L of 4 squares. Every view has height 1 because the L lies flat. The front view is a row of 3 squares and the right view is a row of 2 squares. A quarter turn swaps these.

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A warehouse floor plan shows stack heights of boxes (back row first...	Word problem	19
2	From the front, a worker sees stack heights 2, 3, 2. Can the wareho...	Explain	No. The tallest stack in each column is 2, 3 or 2
3	A student says the number of cubes in a structure equals the sum of...	Word problem	Front view $2 + 3 + 2 = 7$, but the structure has 13 cubes. Hidden cubes are not shown
4	Two structures have the same front view and the same right view. Ca...	Explain	Yes. For front 2, 3, 2 and right 3, 2, 1 the number of cubes can be anywhere from 8 to 16
5	Draw the top view of Structure Q. Write the stack height in each sq...	Drawing or graph	Top view is a plus sign: back-centre 1; middle row 1, 1, 1; front-centre 2
6	A 3 by 3 by 3 cube is made of 27 small cubes. How many small cubes...	Word problem	9 visible from the front face; 18 not visible

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student says a structure with stack heights 1, 0, 2 / 3, 1, 1 / 0...	Error analysis	The front view shows only the tallest stack in each column. Hidden cubes are not counted: $1 + 0 + 2 + 3 + 1 + 1 + 0 + 2 + 1 = 11$ cubes
2	A structure has stack heights 1, 0, 1 / 2, 1, 0 / 1, 2, 1 (back row...	Calculation	9
3	A student writes the right view of the structure 1, 1, 2 / 0, 1, 1...	Error analysis	From the right, the front is on the left. Front row is 3, middle 1, back 2: 3, 1, 2
4	Give the right view of the structure 2, 0, 1 / 1, 1, 3 / 0, 1, 1 (b...	Calculation	1, 3, 2
5	A student says a structure with 8 cubes has 3 cubes after a quarter...	Error analysis	Rotating moves the stacks but does not add or remove cubes. The structure still has 8 cubes
6	A structure has 6 cubes. After a 90° turn, how many cubes?	Calculation	6

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Is a triangle with sides 6, 7 and 10 a right triangle? Show $a^2 + b^2$...	Calculation	No: $6^2 + 7^2 = 85$ but $10^2 = 100$
2	The relation is $y = 2x - 6$. Write the ordered pair when $x = 9$.	Calculation	(9, 12)
3	Solve $4(x + 6) = -32$. Check your answer.	Calculation	-14
4	A cylinder has radius 3 cm and height 6 cm. Find its surface area....	Calculation	169.6 cm^2
5	Solve $4x - 6 = 22$. Check your answer.	Calculation	7
6	The base area of a prism is 18 cm^2 and its height is 7 cm. Find the...	Calculation	126 cm^3
7	Find the missing value so that (8, ?) is on $y = 4x + 3$.	Calculation	35

Q	Question (start)	Type	Answer or expected points
8	A rectangular prism is 6 cm by 5 cm by 2 cm. Find the area of its net.	Calculation	104 cm ²

Unit 19 Tessellations

Try It

Q	Question (start)	Type	Answer or expected points
1	A regular hexagon has interior angle $(6 - 2) \times 180 \div 6 = _\circ$.	Calculation	120
2	Angles around a point add to $_\circ$. Two 150° angles and one 60° angle...	Calculation	360; 360
3	A regular triangle has interior angle $(3 - 2) \times 180 \div 3 = _\circ$.	Calculation	60
4	Three squares meet at a point. The gap is $360 - 3 \times 90 = _\circ$.	Calculation	90

Develop

Q	Question (start)	Type	Answer or expected points
1	Find the interior angle of a regular triangle ($n = 3$).	Calculation	60°
2	Find the interior angle of a regular pentagon ($n = 5$).	Calculation	108°
3	Find the interior angle of a regular hexagon ($n = 6$).	Calculation	120°
4	Find the interior angle of a regular octagon ($n = 8$).	Calculation	135°
5	Find the interior angle of a regular decagon ($n = 10$).	Calculation	144°
6	Can regular triangles tessellate by themselves? Check whether 60° d...	Calculation	Yes: $360 \div 60 = 6$
7	Can regular squares tessellate by themselves? Check whether 90° div...	Calculation	Yes: $360 \div 90 = 4$
8	Can regular pentagons tessellate by themselves? Check whether 108° ...	Calculation	No: $360 \div 108 = 3.33$

Q	Question (start)	Type	Answer or expected points
9	Can regular hexagons tessellate by themselves? Check whether 120° d...	Calculation	Yes: $360 \div 120 = 3$
10	Can regular octagons tessellate by themselves? Check whether 135° d...	Calculation	No: $360 \div 135 = 2.67$
11	A scalene triangle has angles 50° , 60° and 70° . Place each angle tw...	Word problem	$2 \times (50 + 60 + 70) = 2 \times 180 = 360^\circ$
12	An irregular quadrilateral has angles 80° , 90° , 100° and 90° . Find...	Explain	$80 + 90 + 100 + 90 = 360^\circ$. Using each angle once at a point fills exactly 360° , so it tessellates
13	Can a square and two regular octagons meet at a vertex without a ga...	Calculation	Yes: $90 + 135 + 135 = 360^\circ$
14	Three regular pentagons meet at a point. How large is the gap?	Calculation	$360 - 3 \times 108 = 36^\circ$
15	A rectangle 6 cm by 4 cm has a 3 cm^2 piece cut from one side and sl...	Explain	24 cm^2 . Sliding a piece does not change the total area
16	Name the transformation that moves a tile along a straight path wit...	Word problem	Translation; reflection; rotation
17	Name two places where you see tessellations in the environment.	Calculation	Examples: brick walls, floor tiles, honeycomb

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A designer wants to tile a floor with one kind of regular polygon....	Word problem	Triangle, square and hexagon
2	Six equilateral triangles meet at a point. Show that the angles add...	Calculation	$6 \times 60 = 360$
3	Explain why regular pentagons do not tessellate. Use the angles at...	Explain	3 pentagons leave a 36° gap; 4 pentagons need 432° , more than 360°

Q	Question (start)	Type	Answer or expected points
4	Explain why any triangle will tessellate. Use the angle sum 180° .	Explain	Rotate a copy of the triangle 180° about the midpoint of one side to make a parallelogram, which tessellates by translation. Each vertex then has the three angles a, b and c twice: $2(a + b + c) = 2 \times 180 = 360^\circ$
5	A tile is a regular nonagon ($n = 9$). Find its interior angle. Does...	Calculation	140° ; $360 \div 140 = 2.57 \dots$, no
6	Draw a tessellation using a translation of a parallelogram. Label t...	Drawing or graph	Check: copies of the parallelogram slid along its sides with no gaps or overlaps

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student says regular dodecagons (12 sides) tessellate because "tw...	Error analysis	The interior angle is 150° . $360 \div 150 = 2.4$, not a whole number. Two dodecagons leave a 60° gap and three overlap (450°). No.
2	Does a regular 20-gon tessellate by itself?	Calculation	No: the interior angle is 162° , and $360 \div 162$ is about 2.2, not a whole number
3	A student says the interior angle of a regular 18-gon is $180 \div 18 = \dots$	Error analysis	Use $(n - 2) \times 180 \div n = 16 \times 180 \div 18 = 160^\circ$
4	Find the interior angle of a regular octagon.	Calculation	135°
5	A student says cutting a piece from a tile and sliding it to the ot...	Error analysis	Sliding a piece does not add or remove area, so the area stays the same
6	A 5 cm by 4 cm rectangle has a piece slid from one side to the othe...	Calculation	20 cm^2

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	A cylinder has radius 9 cm and height 2 cm. Find its volume. Use $\pi \dots$	Calculation	508.7 cm^3

Q	Question (start)	Type	Answer or expected points
2	A right triangle has legs 9 and 40. Find the hypotenuse. If it is n...	Word problem	41
3	Solve $x \div 6 + 7 = 2$. Check your answer.	Calculation	-30
4	A cube has edge 5 cm. Find the total area of its net.	Calculation	150 cm^2
5	Find the surface area of a rectangular prism 7 cm by 4 cm by 3 cm.	Calculation	122 cm^2
6	Solve $x \div 8 = -3$. Check your answer.	Calculation	-24
7	The relation is $y = 6x - 3$. Find x when y = 45. Write the ordered p...	Calculation	(8, 45)
8	Does the point (7, 23) lie on the relation $y = 3x + 2$? Show why or...	Explain	Yes. When $x = 7$, $y = 3(7) + 2 = 23$

Checkpoint 5

Q	Question (start)	Type	Answer or expected points
1	A right triangle has legs 15 and 20. Find the hypotenuse.	Calculation	25
2	A right triangle has hypotenuse 13 and one leg 12. Find the other leg.	Calculation	5
3	How many faces does a triangular prism have?	Calculation	5
4	Find the surface area of a rectangular prism 4 cm by 3 cm by 2 cm.	Calculation	52 cm^2
5	A cylinder has radius 3 cm and height 8 cm. Find its volume. Use π ...	Calculation	226.1 cm^3
6	A structure has 13 cubes. It is turned 90° . How many cubes does it...	Calculation	13
7	Find the interior angle of a regular 24-gon.	Calculation	165°
8	Do regular decagons tessellate? Use the angle 144° .	Calculation	No: $360 \div 144 = 2.5$, not a whole number

Ready Check 6

Q	Question (start)	Type	Answer or expected points
1	Find the mean of 4, 6, 8, 10, 12.	Calculation	8
2	Find the median of 8, 3, 12, 5.	Calculation	6.5
3	A bag has 3 red and 9 blue marbles. Write P(red) as a simplified fr...	Calculation	$\frac{1}{4}$
4	List the sample space for flipping two coins.	Calculation	HH, HT, TH, TT
5	A circle graph shows 240 people. One section has a 90° angle. How m...	Calculation	60
6	Write 25% as a fraction in simplest form.	Calculation	$\frac{1}{4}$

Unit 20 Critiquing Data Displays

Try It

Q	Question (start)	Type	Answer or expected points
1	On a graph whose axis starts at 20, Store A's bar reaches 28. It lo...	Calculation	8
2	Store B's bar reaches 38. It looks $(38 - 20) = \underline{\hspace{1cm}}$ units tall.	Calculation	18
3	B looks $\underline{\hspace{1cm}}$ times as tall as A $(18 \div 8)$.	Calculation	2.25
4	The true ratio of sales is $38 \div 28 \approx \underline{\hspace{1cm}}$ (to 2 decimals).	Calculation	1.36

Develop

Q	Question (start)	Type	Answer or expected points
1	Graph 1 starts the vertical axis at 50. By how many times does Stor...	Word problem	Looks 3 times as tall $((56 - 50) \div (52 - 50) = 3)$. True ratio $56 : 52 = 14 : 13$, about 1.08
2	Graph 2 shows the same sales with the axis starting at 0. Which gra...	Explain	Graph 2. Starting at 0 makes bar heights proportional to the sales
3	Write one sentence that is true for both graphs about the sales of...	Calculation	Store B sold \$4000 more than Store A
4	Graph 3 and Graph 4 show the same temperatures. Which graph makes t...	Word problem	Graph 3: its vertical axis only runs from 19.5 to 22.5, so the line looks steep
5	Use Graph 4. How much did the temperature rise from day 1 to day 5?...	Word problem	2°C; it looks small because the axis runs from 0 to 40
6	A table groups how many students scored in each interval. Interval...	Word problem	8, 8 and 6 students per 10 marks. No: the wide interval makes the bar look tallest, but the density is the same as the first interval
7	A double bar graph compares boys and girls in three clubs. Boys: Ar...	Word problem	Art, by 2 students. It puts two groups side by side so they are easy to compare

Q	Question (start)	Type	Answer or expected points
8	Give one advantage and one disadvantage of a pictograph compared wi...	Calculation	Advantage: quick and eye-catching. Disadvantage: part icons are hard to read exactly, and icons of different sizes can mislead
9	Which graph is best to show how a town's population changed over 10...	Explain	Line graph: it shows change over time
10	Which graph is best to show what fraction of a budget goes to each...	Explain	Circle graph: it shows parts of a whole
11	Which graph is best to compare the heights of five trees? Justify.	Explain	Bar graph: it compares separate categories
12	A headline says "Sales soared!" and shows Graph 1. A second headlin...	Word problem	The two conclusions disagree. Graph 2 (axis from 0) shows sales differ by only about 8%, so "about the same" is better supported

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A pictograph uses a person icon for 10 votes. For 20 votes the arti...	Explain	4 times as large. The bigger icon looks 4 times as large but the value is only 2 times
2	Two bars both have height 20 but one is drawn twice as wide. Which...	Explain	They are equal (both 20). A wider bar looks bigger even though only height shows the value
3	A store says "Prices fell!" using a graph whose vertical axis start...	Word problem	2%. The graph makes a small drop look big because the axis only runs from \$90 to \$100
4	A survey graph has no title and no labels on the axes. Name two thi...	Calculation	A title and labelled axes with units (also a source and an even scale)
5	Draw a graph that shows the data $x = 1, 2, 3, 4$ and $y = 5, 6, 7, 8$...	Drawing or graph	Axis from 0 with even intervals; every step the same size

Q	Question (start)	Type	Answer or expected points
6	Explain two ways a graph can be made to mislead without changing an...	Explain	Cut the axis so it does not start at 0; stretch or squash a scale; use uneven intervals; use icons that change size in two directions

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student reads Graph 1 and says Store B sold three times as many a...	Error analysis	The axis starts at 50, so the bars only show differences above 50. True ratio $56 : 52 = 14 : 13$
2	On an axis starting at 40, bars are 44 and 52. How many times talle...	Word problem	Looks 3 times as tall; the true ratio is $52 : 44 = 13 : 11$
3	A student chooses a circle graph to show a temperature change over...	Error analysis	Circle graphs show parts of a whole. A line graph shows change over time
4	What is the best graph to compare the sales of four stores?	Calculation	Bar graph
5	A student says the wider bar is greater even though both bars are 2...	Error analysis	Only the height shows the value. The bars are equal
6	Bars have heights 30 and 15 and equal widths. How many times as gre...	Calculation	2 times

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	A right triangle has hypotenuse 10 and one leg 7. Find the other le...	Word problem	7.1
2	Three regular polygons with 9 sides meet at a point. Their interior...	Word problem	60° overlap
3	Find the surface area of a cube with edge 9 cm.	Calculation	486 cm^2
4	Find the missing value so that $(5, ?)$ is on $y = 6x - 7$.	Calculation	23

Q	Question (start)	Type	Answer or expected points
5	A cylinder has radius 4 cm and height 6 cm. The rectangle in its ne...	Word problem	25.12 cm
6	Solve $6(x - 1) = 48$. Check your answer.	Calculation	9
7	Find the volume of a rectangular prism 9 cm by 5 cm by 4 cm.	Calculation	180 cm^3
8	Solve $-7x = 35$. Check your answer.	Calculation	-5

Unit 21 Probability of Independent Events

Try It

Q	Question (start)	Type	Answer or expected points
1	A coin has 2 outcomes and a spinner has 5, so the sample space has...	Calculation	10
2	$P(\text{tails}) = \frac{1}{2}$ and $P(3) = \frac{1}{5}$, so $P(\text{tails and } 3) = \frac{1}{2} \times \frac{1}{5} = \frac{1}{10}$.	Calculation	10
3	Out of the 10 outcomes, ___ is T3.	Calculation	1
4	If you flip heads, does that change the die roll? Yes or no.	Calculation	no

Develop

Q	Question (start)	Type	Answer or expected points
1	A coin is flipped and a die is rolled. How many outcomes are in the...	Calculation	12
2	A coin is flipped and a spinner with 4 equal sections (red, blue, g...	Word problem	8: HR, HB, HG, HY, TR, TB, TG, TY
3	Two dice are rolled. How many outcomes are in the sample space?	Calculation	36
4	A coin is flipped and a die is rolled. Find $P(\text{heads and a } 4)$.	Calculation	$\frac{1}{12}$
5	A coin is flipped and a die is rolled. Find $P(\text{tails and an even num...})$	Calculation	$\frac{1}{4}$
6	A coin is flipped and the spinner is spun. Find $P(\text{tails and red})$.	Calculation	$\frac{1}{8}$
7	Two dice are rolled. Find $P(\text{both show even numbers})$.	Calculation	$\frac{1}{4}$
8	Two dice are rolled. Find $P(\text{a } 6 \text{ on both dice})$.	Calculation	$\frac{1}{36}$

Q	Question (start)	Type	Answer or expected points
9	A spinner has 5 equal sections numbered 1 to 5 and a die is rolled....	Word problem	$\frac{1}{5}$
10	A bag has 3 red and 2 blue marbles. A marble is drawn, replaced, an...	Word problem	$\frac{9}{25}$
11	Same bag. Find P(red first, then blue).	Calculation	$\frac{6}{25}$
12	Same bag. Are the two draws independent? Explain.	Explain	Yes. The marble is replaced, so the bag is the same for the second draw
13	A coin and a die are used 60 times. How many times do you expect he...	Word problem	5
14	In 60 trials, heads and a 6 happened 8 times. Find the experimental...	Word problem	$\frac{2}{15}$; it is greater than $\frac{1}{12}$ ($\frac{2}{15} \approx 0.133$ versus 0.083), but with only 60 trials some difference is normal
15	Explain why the experimental probability gets closer to the theoret...	Explain	More trials reduce the effect of chance, so results settle near the true probability (the Law of Large Numbers)

Apply and Reason

Q	Question (start)	Type	Answer or expected points
1	A basketball player makes 70% of free throws. Two shots are indepen...	Calculation	$\frac{49}{100}$ or 49%
2	A fair coin is flipped three times. Find P(three heads).	Calculation	$\frac{1}{8}$
3	A student rolls a die and flips a coin. Write P(a number less than...	Calculation	$\frac{1}{6}$
4	Spinner A has 3 equal sections (1, 2, 3). Spinner B has 4 equal sec...	Calculation	$\frac{1}{12}$
5	A bag has 3 red and 2 blue marbles. A marble is drawn and kept. The...	Explain	No. Keeping the first marble changes what is in the bag for the second draw
6	Draw a tree diagram for a coin flip followed by a spin of a 3-colou...	Drawing or graph	6 final branches

Recalculate

Q	Question (start)	Type	Answer or expected points
1	A student finds P(heads and 6) as $\frac{1}{2} + \frac{1}{6} = \frac{2}{3}$. What went wro...	Error analysis	For independent events, multiply: $\frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$
2	Find P(tails and red) for a coin and a spinner with 4 equal colore...	Calculation	$\frac{1}{8}$
3	A coin lands heads 5 times in a row. A student says tails is due ne...	Error analysis	The coin has no memory. Each flip is independent: $P(\text{heads}) = \frac{1}{2}$
4	A coin has landed tails 3 times. What is P(heads) on the next flip?	Calculation	$\frac{1}{2}$
5	A student says a coin and a die have 8 outcomes ($2 + 6$). What went...	Error analysis	Multiply the number of outcomes: $2 \times 6 = 12$
6	A coin and a 4-colour spinner. How many outcomes?	Calculation	8

Mixed Review

Q	Question (start)	Type	Answer or expected points
1	Is a triangle with sides 20, 21 and 29 a right triangle? Show $a^2 + \dots$	Calculation	Yes: $20^2 + 21^2 = 841$ and $29^2 = 841$
2	Solve $x \div 8 - 5 = 1$. Check your answer.	Calculation	48
3	The base area of a prism is 45 cm^2 and its height is 6 cm. Find the...	Calculation	270 cm^3
4	Find $\frac{3}{8} + 0.25$. Write the answer as a fraction.	Calculation	$\frac{5}{8}$
5	A cylinder has radius 4 cm and height 9 cm. Find its surface area....	Calculation	326.6 cm^2
6	Find the interior angle of a regular heptagon ($n = 7$). Round to 1 d...	Calculation	128.6°
7	Solve $7x + 2 = -40$. Check your answer.	Calculation	-6

Q	Question (start)	Type	Answer or expected points
8	A rectangular prism is 7 cm by 3 cm by 4 cm. Find the area of its net.	Calculation	122 cm ²

Checkpoint 6

Q	Question (start)	Type	Answer or expected points
1	On a graph, bars of 62 and 70 are drawn on an axis that starts at 6...	Word problem	5 times
2	Which graph shows how a quantity changes over time?	Calculation	Line graph
3	A coin is flipped and a die is rolled. Find P(tails and a 5).	Calculation	$\frac{1}{12}$
4	Two dice are rolled. Find P(both show 6).	Calculation	$\frac{1}{36}$
5	A coin is flipped three times. Find P(three heads).	Calculation	$\frac{1}{8}$
6	How many outcomes are in the sample space for a coin and a 4-colour...	Calculation	8
7	A coin and a die are used 120 times. How many times do you expect h...	Calculation	30
8	Two bars are both 20 tall but one is drawn twice as wide. Which val...	Calculation	They are equal; only height shows the value

Cumulative Check

Q	Question (start)	Type	Answer or expected points
1	Find $\sqrt{196}$.	Calculation	14
2	Use prime factorization to decide whether 150 is a perfect square.	Calculation	No: $150 = 2 \times 3 \times 5^2$, and 2 and 3 have odd exponents
3	Between which two consecutive whole numbers is $\sqrt{83}$? Which whole num...	Calculation	9 and 10; closer to 9 (81 is 2 below 83, 100 is 17 above)
4	Write 0.4% as a decimal and as a fraction in simplest form.	Calculation	0.004; $\frac{1}{250}$
5	Find 140% of 75.	Calculation	105
6	A club has 18 beginners, 12 intermediates and 6 advanced players. W...	Word problem	3:2:1; 80 km/h
7	On a map, 1 cm represents 15 km. Two towns are 6.4 cm apart on the...	Calculation	96 km
8	Find $\frac{2}{3} \times 3\frac{3}{4}$.	Calculation	$2\frac{1}{2}$
9	Find $4\frac{1}{2} \div \frac{3}{4}$.	Calculation	6
10	Find $(-6) \times (-7)$ and $(-42) \div 6$.	Calculation	42; -7
11	Find $-3 + 4 \times (-2)$.	Calculation	-11
12	Ribbon costs \$1.75 per metre. Find the cost of 2.4 m. Estimate first.	Calculation	\$4.20 (about $2 \times 2 = 4$)
13	For $y = 3x - 1$, complete a table for $x = 0, 1, 2, 3$.	Calculation	-1, 2, 5, 8
14	Is the point (5, 14) on the relation $y = 3x - 1$? Show why.	Explain	Yes: $3(5) - 1 = 14$
15	Solve $-4x + 6 = -10$. Check your answer.	Calculation	4
16	Solve $3(x + 2) = 21$. Then solve $x \div 5 - 2 = 3$.	Calculation	5; 25
17	A right triangle has legs 28 and 45. Find the hypotenuse.	Calculation	53

Q	Question (start)	Type	Answer or expected points
18	Is a triangle with sides 9, 40 and 41 a right triangle? Show why.	Explain	Yes: $81 + 1600 = 1681 = 41^2$
19	A net has 2 circles and 1 rectangle. Which solid is it?	Calculation	A cylinder
20	A cylinder has radius 3 cm and height 5 cm. Find its surface area....	Calculation	150.7 cm^2
21	A triangular prism has a right-triangle base with legs 6 cm and 8 c...	Calculation	120 cm^3
22	The table shows stack heights of a structure (back row first). Give...	Word problem	3, 2, 2; 15 cubes
23	Find the interior angle of a regular hexagon. Does it tessellate? E...	Explain	120° ; yes, $3 \times 120^\circ = 360^\circ$
24	A graph has bars of 34 and 38 on an axis that starts at 30. How man...	Word problem	Looks 2 times as tall; true ratio $38 : 34 = 19 : 17$
25	A coin is flipped and a die is rolled. Find $P(\text{tails and an odd numb...})$	Calculation	$\frac{1}{4}$
26	A coin and a die are used 120 times. How many times do you expect h...	Calculation	10

Final Recalculate

Q	Question (start)	Type	Answer or expected points
1	Jordan says 200 is a perfect square because $20 \times 10 = 200$. Is Jorda...	Explain	No. A perfect square needs two equal factors; $200 = 2^3 \times 5^2$ has an odd exponent
2	Is 256 a perfect square?	Calculation	Yes: $256 = 2^8$ and $\sqrt{256} = 16$
3	A student writes $0.7\% = 0.7$ as a decimal. What went wrong? Give the...	Explain	$0.7\% = 0.7 \div 100 = 0.007$
4	Write 320% as a decimal.	Calculation	3.2
5	A student writes $\frac{5}{6} \div \frac{1}{3} = \frac{5}{18}$. What went wrong? Give the cor...	Explain	Multiply by the reciprocal: $\frac{5}{6} \times 3 = 2\frac{1}{2}$
6	Find $8 \div \frac{1}{4}$.	Calculation	32
7	A student writes $6 + (-3) \times 4 = 12$. What went wrong? Give the corre...	Explain	Multiply first: $6 + (-12) = -6$
8	Find $8 + (-5) \times 2$.	Calculation	-2
9	A student solves $5(x + 2) = 35$ and writes $5x + 2 = 35$. What went wr...	Explain	$5(x + 2) = 5x + 10$, so $5x = 25$ and $x = 5$
10	Solve $4(x + 1) = 28$.	Calculation	6
11	A student finds the hypotenuse for legs 15 and 36 and writes $c = 15$...	Explain	$15^2 + 36^2 = c^2$. $c = \sqrt{1521} = 39$
12	Legs are 20 and 21. Find the hypotenuse.	Calculation	29
13	A student finds the volume of a cylinder with diameter 10 cm and he...	Explain	The radius is half the diameter: $r = 5$. $V = 3.14 \times 25 \times 4 = 314 \text{ cm}^3$
14	Find the volume of a cylinder with diameter 12 cm and height 5 cm.	Calculation	565.2 cm^3
15	A student wants P(heads and blue) on a 4-section spinner and adds:...	Explain	Independent events are multiplied: $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$
16	Find P(heads and blue) for a coin and a spinner with 3 equal colour...	Calculation	$\frac{1}{6}$