

*School Name*  
*Mathematics Test 2017*

Year 9

*Ratio and Rates*

Non Calculator

**Skills and Knowledge Assessed:**

- Solve a range of problems involving rates and ratios, with and without digital technologies (ACMNA188)

Name \_\_\_\_\_

**Section 1**      Short Answer Section

Write all working and answers in the spaces provided on this test paper.

1. Simplify the ratio 15 : 25.

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2. There are 18 cats and 24 dogs in the Mountains Pet Resort.

What is the ratio of cats to dogs in simplest form?

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3. Divide 35 kg in the ratio 1 : 6.

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4. The ratio of men to women at a party was 5 : 4.  
If there were 36 women at the party, how many men were there?

.....

.....



5.	A charity delivers 2000 kg of rice to a village of 500 people. How many kg/person is this?  ..... .....
6.	Bill runs a 21 km half-marathon at an average speed of 10 km/h. How long did it take him to complete the half-marathon?  ..... .....
7.	Write 2.4 : 0.3 in simplest terms.  ..... .....
8.	Divide an 2.4 tonnes in the ratio 3 : 1. (Answer in kilograms)  ..... .....
9.	Simplify the ratio $\frac{3}{4} : \frac{5}{8}$ .  ..... .....
10.	In the school hall, there are teachers and students in the ratio 2 : 45. If there are 16 teachers, how many people are in the hall?  ..... .....
11.	The stocking rate for a large cattle station is 6.5 head/hectare. How many hectares would be needed to stock 13 000 head of cattle?  ..... .....

12.	<p>A truck uses fuel at a rate of 45 litres/100km. How much fuel would it use in travelling 2000 km?</p> <p>.....</p> <p>.....</p>
13.	<p>One telescope can turn through a half revolution while viewing the sky. A second telescope can only turn through an angle of <math>140^\circ</math>. What is the ratio of their viewing angles?</p> <p>.....</p> <p>.....</p>
14.	<p>Simplify the ratio 36 : 45 : 72.</p> <p>.....</p> <p>.....</p>
15.	<p>Emma has 2400 MB of photos, 1500 MB of videos and 1200 MB of music on her smartphone. Write in simplest form the ratio of Photos : Videos : Music on her phone?</p> <p>.....</p> <p>.....</p>
16.	<p>The ratio of Alt-Country : Techno : R&amp;B music tracks on Kacey's phone is 8 : 3 : 10. There are 88 tracks which are either Alt-Country or Techno. How R&amp;B tracks are there on her phone?</p> <p>.....</p> <p>.....</p>
17.	<p>Justin is going to run in a race which is 10.5 km long. His average speed is 14 km/h in race conditions. If the race starts at 6:15 am. What time could he expect to finish?</p> <p>.....</p> <p>.....</p>

18. A crop-dusting plane flies at a speed of 130 km/h.  
The plane spreads 15 kg of fertiliser per minute.  
If the plane is intending to drop 1.8 tonnes of fertiliser, how many kilometres will it fly?

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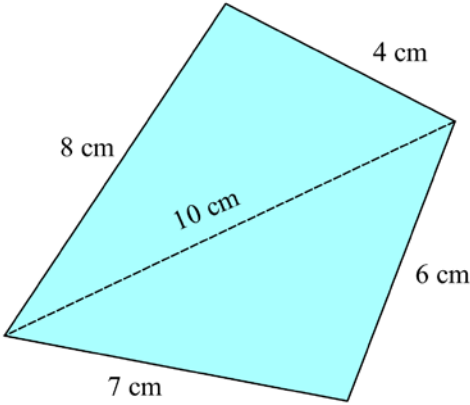
Name \_\_\_\_\_

**Section 2**      Multiple Choice Section

Mark all your answers on the accompanying multiple choice answer sheet, not on this test paper. You may do any working out on this test paper. Calculators are allowed for this section.

- |           |   |
|-----------|---|
| <b>1.</b> | There are 65 000 Tigers fans and 35 000 Demons fans watching a match.<br>What is the ratio of Tigers fans to Demons fans?<br><br>A.    10 : 7                      B.    13 : 5                      C.    13 : 7                      D.    20 : 7 |
| <b>2.</b> | In a town the ratio of homes to shops is 12 : 5.<br>If there were 100 shops, how many homes were there?<br><br>A.    120                      B.    180                      C.    200                      D.    240                               |
| <b>3.</b> | Which ratio is not equivalent to 4 : 6 ?<br><br>A.    2 : 3                      B.    5 : 9                      C.    16 : 24                      D.    20 : 30  |
| <b>4.</b> | Simplify the ratio 48 : 32.<br><br>A.    3 : 1                      B.    3 : 2                      C.    4 : 3                      D.    5 : 3   |
| <b>5.</b> | A car travels 340 km and takes 4 hours for the trip.<br>What is its average speed in km/h?<br><br>A.    85 km/h                      B.    90 km/h                      C.    95 km/h                      D.    105 km/h                           |

6.	<p>A harvester can cover 3.5 hectares/hour.</p> <p>How many hectares would it cover when it works 5 days completing 12 hours each day?</p> <p>A. 120 hectares      B. 180 hectares      C. 210 hectares      D. 350 hectares</p>
7.	<p>Kerry has 200 books and Leisa has 160 books.</p> <p>What is the ratio of the number of Kerry's books to Leisa's books?</p> <p>A. 5 : 4      B. 6 : 5      C. 10 : 7      D. 12 : 5</p>
8.	<p>Simplify the ratio <math>35\% : 12\frac{1}{2}\%</math>.</p> <p>A. 7 : 3      B. 7 : 5      C. 14 : 3      D. 14 : 5</p>
9.	<p>Mike and Mal have a business building cabins.</p> <p>Mike takes 20 days to build a standard cabin, while Mal takes 5 weeks.</p> <p>What is the ratio of Mike's build time to Mal's time?</p> <p>A. 3 : 5      B. 2 : 3      C. 4 : 7      D. 5 : 7</p>
10.	<p>Two rides at a theme park are called the Demon and the Lumberjack.</p> <p>One day, the number of people who rode the Demon and the Lumberjack were in the ratio 9 : 7.</p> <p>If 2025 people rode the Demon, how many rode the Lumberjack?</p> <p>A. 1575      B. 1993 C. 2009      D. 2604</p> 
11.	<p>An engine rotates at 1800 rpm (revolutions per minute).</p> <p>How many revolutions will it make in 40 seconds?</p> <p>A. 1000      B. 1200      C. 1500      D. 1600</p>

12.	In a typing test Josie types 440 words in 8 minutes. How many words would she type in 15 minutes?	
	A. 795                      B. 805                      C. 815                      D. 825	
13.	At a wildlife park the ratio of potoroos to bettongs to quokkas is 4 : 1 : 3. If there are 24 quokkas, how many potoroos are there?	
	A. 26                      B. 28 C. 32                      D. 36	
14.	The ratio of Cattle : Sheep : Horses on a Holiday Farm is 4 : 7 : 3. If there are 28 sheep, how many animals of all three types are there?	
	A. 14                      B. 28                      C. 42                      D. 56	
15.	Simplify the ratio $1\frac{3}{4} : 2\frac{1}{2}$ .	
	A. 7 : 5                      B. 7 : 10                      C. 8 : 5                      D. 13 : 21	
16.	Simplify the ratio $12a^2b^3 : 4ab^2 : 8a^2b^2$ .	
	A. $3ab : 1 : 2a$ B. $3ab : a : 2a$ C. $3ab : 1 : 2ab$ D. $3ab^2 : a : 2b$	
17.	What is the ratio of the length of the diagonal shown, to the perimeter of the quadrilateral?	
	A. 1 : 4 B. 2 : 5 C. 1 : 3 D. 3 : 7	
18.	Deidre divided a donation of \$250 between three charities in the ratio 1 : 3 : 6. How much more is the largest donation compared to the smallest?	
	A. \$75                      B. \$100                      C. \$125                      D. \$150	

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*Multiple Choice Answer Sheet*

*Ratio and Rates*

Name \_\_\_\_\_

Completely fill the response oval representing the most correct answer.

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| 18. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |



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Non Calculator Section

## ANSWERS

Question	Working and Answer
1.	$15 : 25 = 15 \div 5 : 25 \div 5$ $= 3 : 5$
2.	$C : D = 18 : 24$ $= 3 : 4$
3.	$1 + 6 = 7 \text{ parts}$ $\text{Each part} = 35 \div 7 = 5$ $\text{Ratio} = 1 \times 5 : 6 \times 5$ $= 5 \text{ kg} : 30 \text{ kg}$
4.	$M : W = 5 : 4$ $= M : 36$ <p>For women, <math>4 \times 9</math> gives 36 so multiply 5 by 9 to get the number of men <math>5 \times 9 = 45</math> <b>There are 45 men.</b></p>
5.	$\text{Rate} = \frac{2000\text{kg}}{500}$ $= 4 \text{ kg/person.}$
6.	$\text{Time} = 21 \text{ km} \div 10 \text{ km/hrs}$ $= 2.1 \text{ hours}$
7.	$2.4 : 0.3 = 2.4 \times 10 : 0.3 \times 10$ $= 24 : 3$ $= 8 : 1$

Question	Working and Answer
8.	$2.4 \text{ tonnes} = 2400 \text{ kg}$ $3 + 1 = 4 \text{ parts}$ $\text{Each part} = 2400 \div 4 = 600$ $\text{Ratio} = 3 \times 600 : 1 \times 600$ $= \mathbf{1800 \text{ kg} : 600 \text{ kg}}$
9.	$\frac{3}{4} : \frac{5}{8} = \frac{6}{8} : \frac{5}{8}$ $= \mathbf{6 : 5}$
10.	$T : S = 2 : 45$ $= 16 : S$ $\text{Multiply 2 by 8 to get 16.}$ $\text{Multiply 45 by 8 to give number of students.}$ $\text{Students} = 45 \times 8 = 360$ $\text{Total in hall} = 360 + 16 = \mathbf{376 \text{ people}}$
11.	$\text{Since 6.5 head can go on each hectare}$ $\text{No hectares} = \frac{13000}{6.5}$ $= \frac{26000}{13}$ $= \mathbf{2000 \text{ ha}}$
12.	$2000 \text{ km} = 20 \text{ lots of } 100\text{km}$ $\text{Fuel used} = 20 \times 45$ $= \mathbf{900 \text{ litres}}$
13.	$\text{A half revolution} = \frac{360^\circ}{2} = 180^\circ$ $\text{Ratio} = 180 : 140$ $= 18 : 14$ $= \mathbf{9 : 7}$
14.	$36 : 45 : 72 = \frac{36}{9} : \frac{45}{9} : \frac{72}{9}$ $= \mathbf{4 : 5 : 8}$

Question	Working and Answer
15.	Ratio = 2400 : 1500 : 1200 = 24 : 15 : 12 = <b>8 : 5 : 4</b>
16.	Total parts $AC$ and $T = 8 + 3 = 11$ She has 88 of these so Factor = $\frac{88}{11} = 8$ Number of "R&B" = $8 \times 10 = \mathbf{80 \text{ tracks}}$
17.	Time for race = $\frac{D}{S} = \frac{10.5}{14} = \frac{105}{140} = \frac{15}{20} = \frac{3}{4}$ hour $\frac{3}{4}$ hour = 45 minutes <b>"Starts at 6:15 am so should finish at 7:00 am"</b>
18.	1.8 tonnes = 1800 kg To drop 1800 kg would take $\frac{1800}{15} = 120$ minutes = 2 hours In 2 hours it will fly $130 \times 2 = \mathbf{260 \text{ km.}}$

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Calculator Allowed  
Multiple Choice  
Section

## ANSWERS

Question	Working	M C Answer
1.	$\begin{aligned}\text{Ratio} &= 65000 : 35000 \\ &= 65 : 35 \\ &= \frac{65}{5} : \frac{35}{5} \\ &= 13 : 7\end{aligned}$	<b>C</b>
2.	$\begin{aligned}H : S &= 12 : 5 \\ \text{Shops} &= 100 = 5 \times 20 \\ \text{Houses} &= 12 \times 20 = \mathbf{240}\end{aligned}$	<b>D</b>
3.	<p>5 : 9 neither simplifies nor multiplies to give 4 : 6 All the others do.</p>	<b>B</b>
4.	$\begin{aligned}48 : 32 &= \frac{48}{8} : \frac{32}{8} \\ &= 6 : 4 \\ &= 3 : 2\end{aligned}$	<b>B</b>
5.	$\text{Speed} = \frac{340}{4} = 85 \text{ km/h}$	<b>A</b>
6.	$\begin{aligned}\text{Time} &= 5 \times 12 = 60 \text{ hours} \\ \text{Area} &= 3.5 \times 60 = 210 \text{ hectares}\end{aligned}$	<b>C</b>
7.	$\begin{aligned}K : L &= 200 : 160 \\ &= 20 : 16 \\ &= 5 : 4\end{aligned}$	<b>A</b>

8.	$35 : 12\frac{1}{2} = 70 : 25$ $= \frac{70}{5} : \frac{25}{5}$ $= 14 : 5$	<b>D</b>
9.	$20 \text{ days} : 5 \text{ weeks} = 20 \text{ days} : 35 \text{ days}$ $= 4 : 7$	<b>C</b>
10.	$D : L = 9 : 7$ $= 2025 : L$ $\text{Factor} = \frac{2025}{9} = 225$ $L = 225 \times 7$ $= 1575 \text{ people}$	<b>A</b>
11.	$40 \text{ seconds} = \frac{40}{60} = \frac{2}{3} \text{ minute}$ $\text{Number of rotations} = \frac{2}{3} \times 1800$ $= 1200 \text{ revolutions}$	<b>B</b>
12.	$\text{Typing rate} = \frac{440}{8} = 55 \text{ words/min}$ $\text{In 15 minutes she would type } 55 \times 15 = 825 \text{ words.}$	<b>D</b>
13.	$P : B : Q = 4 : 1 : 3$ $= P : B : 24$ $\text{Factor} = \frac{24}{3} = 8$ $P = 4 \times 8 = 32$	<b>C</b>
14.	$C : S : H = 4 : 7 : 3$ $= C : 28 : H$ $\text{Factor} = \frac{28}{7} = 4$ $\text{Total parts} = 4 + 7 + 3 = 14$ $\text{Total animals} = 14 \times 4 = 56$	<b>D</b>

15.	$1\frac{3}{4} : 2\frac{1}{2} = \frac{7}{4} : \frac{5}{2}$ $= \frac{7}{4} : \frac{10}{4}$ $= 7 : 10$	<b>B</b>
16.	$12a^2b^3 : 4ab^2 : 8a^2b^2$ <p>Common factor of all three terms is <math>4ab^2</math></p> $12a^2b^3 : 4ab^2 : 8a^2b^2 = 3ab : 1 : 2a$	<b>A</b>
17.	<p>Perimeter = <math>8 + 4 + 6 + 7 = 25</math> cm</p> <p>Diagonal : Perimeter = <math>10 : 25</math></p> <p><math>= 2 : 5</math></p>	<b>B</b>
18.	<p>Total parts = <math>1 + 3 + 6 = 10</math></p> <p>each part = <math>250 \div 10 = 25</math></p> <p>Largest part = <math>25 \times 6 = 150</math></p> <p>Smallest part = <math>1 \times 25 = 25</math></p> <p>Difference = <math>150 - 25 = 125</math></p>	<b>C</b>

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*Multiple Choice Answer Sheet*

*Ratio and Rates*

Name \_\_\_\_\_

Completely fill the response oval representing the most correct answer.

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