

Pre-enrolment Numeracy Stock-take for the Masters of Teaching & Learning

The mathematics required to complete this test gives you an idea of the mathematical knowledge that is assumed you have upon entering the Masters of Teaching & Learning at JCU.

The general guideline that indicates the level of maths required is the mathematics and numeracy of the Australian Curriculum up to and including year 9 mathematics (<http://www.australiancurriculum.edu.au/mathematics/curriculum/f-10?layout=1>).

The full solutions are provided so that you can correct your work and make a judgement about your preparedness for the Masters of Teaching & Learning course you are planning to pursue. Recommended resources are listed to help you refresh your maths knowledge.

An invigilated test of similar material will take place in the first week of the semester next year. The results of that test will be used to provide you with advice about any remedial actions that may be necessary to satisfy the proficiency required for teaching at the primary school level.

There are 21 questions in this stock-take. Please complete the test showing all working before you correct it.

Calculators are not to be used.

1. Calculate the following: $3 - 3 \times 2 = 3 - 6 = -3$

Note:- This question is testing (1) Order of operations

(2) Operations with integers

2. Calculate the following: $9.65 + 2.09 =$

$$\begin{array}{r} 9.65 \\ + 2.09 \\ \hline 11.74 \end{array}$$

Note:- This question is testing addition of decimals

3. Calculate the following: $14.5 - 6.02 =$

$$\begin{array}{r} 14.50 \\ - 6.02 \\ \hline 8.48 \end{array}$$

Note:- This question is testing subtraction with decimals

4. Calculate the following: $1.2 \times 0.2 =$

$$\begin{array}{r} 1.2 \\ \times 0.2 \\ \hline 0.24 \end{array}$$

Note:- Testing multiplication of decimals.

5. Calculate the following: $896 \div 7 =$

$$\begin{array}{r} 128 \\ 7 \overline{) 896} \\ \underline{7} \\ 19 \\ \underline{14} \\ 56 \\ \underline{56} \\ 0 \end{array}$$

Note:- Both the short division + long division algorithms need to be known.

6. Calculate the following: $\frac{1}{2} + \frac{1}{3} =$

$$\begin{aligned} & \frac{1}{2} + \frac{1}{3} \\ &= \frac{3}{6} + \frac{2}{6} \\ &= \frac{5}{6} \end{aligned}$$

Note:- All four operations (+, -, ×, ÷) with fractions need to be known.

7. Rounded to the nearest 10 kg the weight of a dolphin was reported as 170 kg. Write down the lowest weight (in whole kg) that the dolphin could have been before the rounding. Provide an explanation for your answer.

Lowest weight: 165 kg.

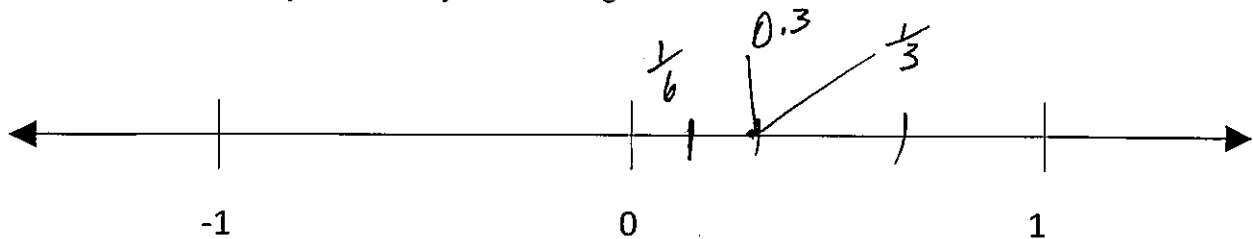
Explanation:

161, 162, 163, 164 are closer to 160 than 170. ∴ rounded to the nearest 10 they are 160 kg
166, 167, 168, 169 " " = 170 than 160.
Convention requires the number in the middle 165 to be rounded up to 170.

8. How many different fractions are there between $\frac{2}{5}$ and $\frac{3}{5}$? Explain your answer.

An infinite number of fractions exist between $\frac{2}{5}$ + $\frac{3}{5}$. This can be shown by finding the number halfway between $\frac{2}{5}$ + $\frac{3}{5}$ and then finding the number halfway between it and $\frac{2}{5}$ and so on. The process never ends.

9. Estimate the location of the numbers 0.3 and $\frac{1}{6}$ on the number line below. Label each number clearly. What was your reasoning?



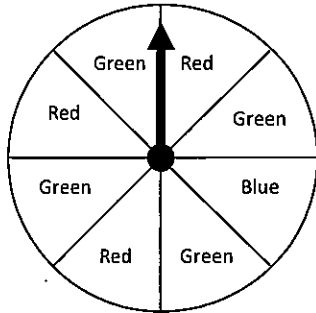
Both #s are +ve so they are to the right of zero.
The decimal 0.3 is almost $\frac{1}{3}$
The fraction $\frac{1}{6}$ is a half of $\frac{1}{3}$

10. Peter was 120 cm tall on his ninth birthday. By his tenth birthday he had grown 20% taller. How tall was Peter when he turned ten? Show your working.

<p>Method 1:- $120 + 20\% \times 120$</p> <p>$= 120 + \frac{20}{100} \times \frac{120}{1}$</p> <p>$= 120 + 24$</p> <p>$= 144 \text{ cm}$</p>	<p>Method 2:- $120 \times 120\%$</p> <p>$= \frac{120}{1} \times \frac{120}{100} \times 2$</p> <p>$= 144 \text{ cm}$</p>
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11. A spinner is a device often used to generate random outcomes for games. An arrow is pinned to the centre of a coloured disk and spun around by flicking it with a finger. The outcome is determined by the colour of the section where the arrow head stops.

What is the probability of getting green on the spinner disk shown below when the arrow is spun? What is your reasoning?



Assuming that the 8 sectors are identical in size,
then the $Pr(\text{green}) = \frac{4}{8}$

$$= \frac{1}{2}$$

$$Pr(\text{green}) = \frac{\# \text{ green sectors}}{\# \text{ total sectors}}$$

12. Sue is in charge of the year Seven cohort at a school. There are five classes with between 20 and 30 students in each class. They all did the same maths test and the teachers have given Sue the average mark for their class (see below).

	Class I	Class II	Class III	Class IV	Class V
Average of each class:	60	80	70	80	90

Sue would like to tell the principal the average for the whole year seven cohort. She adds up the five marks and divides by five. You stop her as she is about to go to the principal and you say: "Sue, that is not right!" What explanation do you give Sue for why she is not correct? What do you tell Sue she has to do?

Adding the averages & dividing by 5 would be O.K. if you knew that there was the same number of students in each class. That is not the case here. So the average requires to multiply each class av. by the # students in that class; find the sum of those 5 calculations & divide by the total # students.

13. In a recipe, 6 cups of sugar are required for every 10 cups of flour. How much sugar do you need if you have 20 tablespoons of flour?

Note: - You do not need to know how many tablespoons make a cup!!

This is a ratio situation

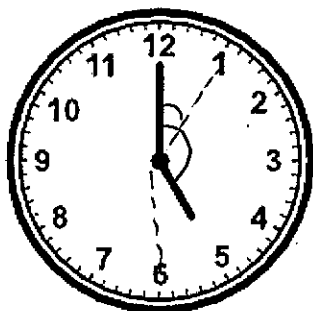
Sugar : flour

$$6 : 10 \quad \downarrow \times 2$$

$$12 : 20$$

You need 12 tablespoons of sugar.

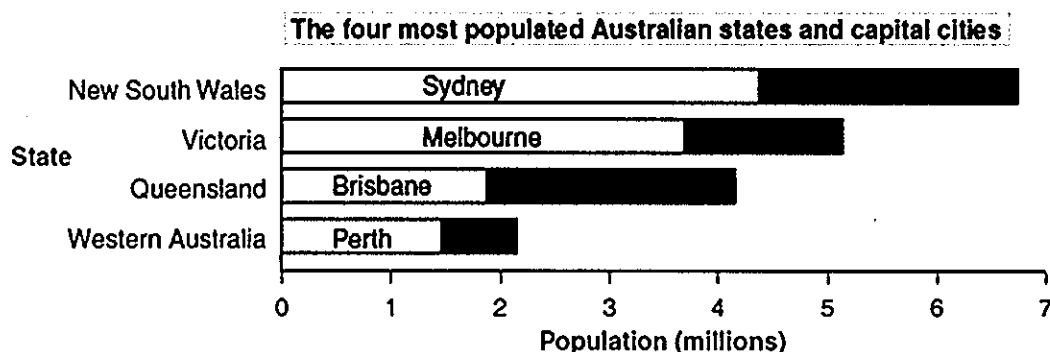
14. The time of the clock below is 5 o'clock. What is the size of the smaller angle created between the hour hand and the minute hand on the clock? Show your working near the image.



The angle from 12 to 6 is 180°
 The angle from 12 to 1 is $\frac{360^\circ}{12} = 30^\circ$
 Each sector has a centre angle of 30°
 \therefore Required angle is $180^\circ - 30^\circ = 150^\circ$
 Another approach is $\frac{25}{60} \times \frac{360}{1} = 150^\circ$

(Adapted from Naplan Example Test Yr7)

15. Each bar of this graph shows the population of a state and the population of its capital city.



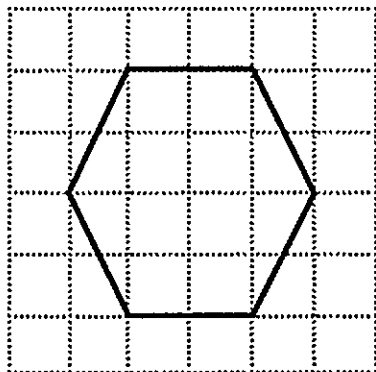
Which of these states has the lowest percentage of its population living in the state capital?
 What is your reasoning?

- a. New South Wales
 b. Victoria
 c. Queensland
 d. Western Australia

The population of the capital city in each of the states NSW, VIC and W.A. is more than half of the pop. in the respective states. Brisbane is less than half so the answer is Qld.

(Naplan Example Test Yr7)

16. A six-sided figure is drawn on a centimetre square grid as shown. What is the distance around the edge of the figure? Write your explanation.



(Ryan & McCrae, 2005)

- a. 12 cm
 b. more than 12 cm
 c. less than 12 cm
 d. you cannot tell

*The horizontal sides are 2 units each
 The 4 remaining sides are longer than 2
 because they are diagonals of rectangles that are
 1 unit by 2 units.*

17. If a is equal to 6, then what does $a^2 + 9$ equal?

$$6^2 + 9 = 45$$

18. Claire thinks of a number, n .

She multiplies the number by itself.

She then halves that number and subtracts 10.

Select an expression from the choices below to show what Claire did.

$$n \times n \quad \frac{n^2}{2} - 10$$

(Naplan Example Test Yr9)

a. $\frac{2n-10}{2}$

b. $\frac{2n}{2} - 10$

c. $\frac{n^2}{2} - 10$

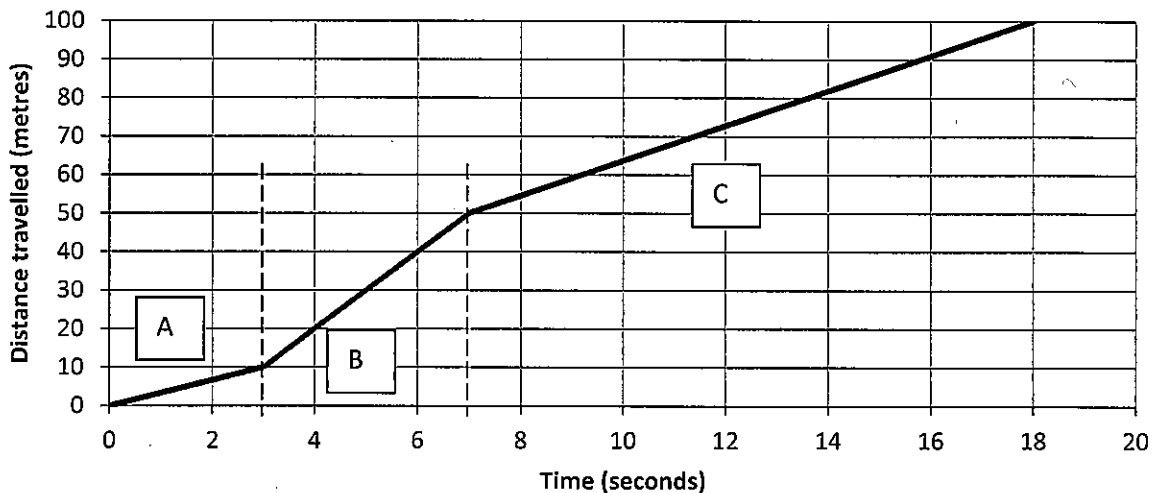
d. $\frac{n^2-10}{2}$

19. Find the value of x if $4x - 3 = 11$. Show your working.

$$\begin{array}{r}
 4x - 3 = 11 \\
 4x - 3 + 3 = 11 + 3 \\
 4x = 14 \\
 \frac{4x}{4} = \frac{14}{4} \\
 x = \frac{7}{2}
 \end{array}
 \qquad
 \begin{array}{r}
 \text{Check } 4 \times \frac{7}{2} - 3 \\
 = 14 - 3 \\
 = 11 \\
 \therefore x = \frac{7}{2} \text{ is correct.}
 \end{array}$$

20. Peter ran in a 100 metre race. The graph below shows the distance Peter travelled and the time it took.

Peter's 100m Race



There are 3 distinct phases to Peter's race, A, B and C. Identify in which phase of the race was Peter going his fastest and explain your answer by referring to the graph.

B is the answer because the gradient of the line is the biggest in that section of the graph. Gradient in a distance / time graph is speed.

21. A passenger train leaves the train depot 2 hours after a freight train left the same depot. The freight train is traveling on average 40 kms per hour more slowly than the passenger train. Find the average speed of each train, if the passenger train overtakes the freight train in three hours. Draw a diagram to help you. Show all working.

Let x be speed of passenger train

$x - 40$ is speed of freight train.

When the p.t. has travelled 3 hrs, the f.t. has travelled 5 hrs.

At that point, they have travelled the same distance.

$$i.e. \quad 3x = 5(x - 40)$$

$$3x = 5x - 200$$

$$3x - 5x = 5x - 200 - 5x$$

$$-2x = -200$$

$$\frac{-2x}{2} = \frac{-200}{2}$$

$$x = 100 \quad + \quad 100 - 40 = 60$$

Av. speed of p. train is 100 km/hr + of f. train is 60 km/hr.