Year 7 Numeracy 01 Worksheet

Twenty-five questions covering the full range of numeracy at a Year 7 level, including questions on area and volume, measurement, geometry, mathematical operations and general number sense.



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Questions

1. When Amelia dropped a ball from a balcony 16 metres above the ground she noticed that it rose half as high again on each bounce.

Drop	After 1st bounce and fall	After 2nd bounce and fall	After 3rd bounce and fall
16 m	8 m + 8 m	4 m + 4 m	2 m + 2 m
Total	32 m	40 m	44 m

How far in total had the ball travelled when it reached the ground again **after** the 5th bounce?

- a. 46 m
- b. 48 m
- c. 31 m
- d. 47 m

Answer: _____

2. The Australian Bureau of Statistics reports the middle (median) age for residents in Australian states in 1989 and 2009.



Which statement is true?

a. The median age in NSW increased by 10 years between 1989 and 2009.

- b. Queensland has the highest median age.
- c. The median age for the Northern Territory is above the median age for Australia.
- d. In all states the median age has increased since 1989.

Answer: _____



3. A pentagon has 5 diagonals.

The table shows the numbers of diagonals for more polygons.

Number of sides	Number of Diagonals
Triangle, 3	0
Square, 4	$4 \times 1 \div 2 = 2$
Pentagon, 5	$5 \times 2 \div 2 = 5$
Hexagon, 6	$6 \times 3 \div 2 = 9$
Heptagon, 7	$7 \times 4 \div 2 = 14$
Octagon, 8	?

How many diagonals does an octagon have?

- a. 8
- b. 20
- c. 16
- d. 25

Answer: _____

4. Sheena scored 33 out of 40 for Science and 65 out of 90 for Mathematics.

Use the graphs to convert Sheena's scores to percentages.



CONVERSION GRAPHS - SCORE to %

In which subject did Sheena get the higher percentage?

Answer:							

5. One cubic centimetre of water weighs one gram. Which container has the heaviest amount of water?







Answer: _____

6. In the diagram θ represents a number.



Find the value of θ .

- a. 15
- b. 30
- c. 360
- d. 60

Answer:	

7. The table shows the water usage per day for four households and the number of occupants in each house.

House Street No.	Number of occupants	Water used in L
1	4	3000
3	6	4800
5	2	1700
7	3	2500

Which household was most economical (used the least water per person)?

- a. No. 1
- b. No. 7
- c. No. 5
- d. No. 3

Answer: _____

8. A survey of Year 7 students shows 60% have Wheetyflakes for breakfast, 25% have toast with Vegispread and 15% have eggs.

Which pie chart shows the results of this survey?



b.







7

Answer:	
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Answer: _____

10. The fractions of the whole tangram are written on six of the seven pieces.



What fraction is missing from the seventh piece?

- a. 3/8
- b. 1/4
- c. 1/8
- d. 1/16

Answer: _____

11. Black and white keys on a piano are grouped in 12s as shown.



Consider how many groups of 12 there are on an 88-key piano.

How many keys are left over in incomplete groups at the ends of the keyboard?

- a. 7 groups with 4 left over
- b. 7 groups with 0 left over
- c. 12 groups with 7 left over
- d. 12 groups with 4 left over

Answer: _____

12. ξ stands for a whole number.

Which expression is equal to

Hint: Think of 6 x ξ + 9 as a product of two factors and then simplify the algebraic fraction.

a. $2 \times \xi + 9$ b. $6 \times \xi + 3$ c. $2 \times \xi + 3$ d. $6 \times \xi + 6$

Answer: _____

13. A "House of Cards" is built by leaning pairs of playing cards together and placing other cards horizontally across the top.



Think about the total numbers of cards used at each stage and the numbers of cards added.

How many cards in total will be in a House of Cards at Stage 5?

Answer: _____

14. Paul had twenty turns at 10 pin bowling. There are 2 throws for each turn.

1st throw	2nd throw	Total
1	4	5
5	4	9
7	1	8
0	2	2
6	3	9
0	0	0
5	2	7
0	1	1
8	0	8
0	2	2
9	0	9
2	1	3
3	2	5
0	9	9
0	5	5
6	1	7
6	0	6
0	0	0
2	2	4
0	3	3

In what percentage of turns did Paul total 7 or more?

a. 60%

- b. 80%
- c. 40%
- d. 20%

Answer: _____

15. Five hundred and ninety-seven students from Kudgee High School are going on a Geography Excursion that costs \$9.05 per student.

The School Principal, Mrs Blake, estimates the total cost by rounding the numbers off to 600 students at \$9.00 per head.

Will Mrs Blake's estimate be **above** or **below** the actual cost?

- a. The estimate will be above the actual cost.
- b. The estimate will be below the actual cost.
- c. The estimate will match the actual cost exactly.

Answer: _____

16. Which number is the smallest?

- a. One third of six eighths
- b. One half of three quarters
- c. One eighth of seven
- d. One fifth of five eighths

Answer: _____

17. First use the angle sum of a quadrilateral to find *z*.



What does (x + y) equal?

- a. 107
- b. 73
- c. 24
- d. 25

Answer: _____

18. A solid cone and a hemisphere made of coloured plastic are joined together and sliced along the dotted line.



What is the shape of the cross-section?



d.		

19. On New Years Day the temperature in Adelaide was 38°C and, at the same time, in Moscow it was 44 degrees colder.

What was the temperature in Moscow in degrees Celsius (°C)?

- a. 6°C
- b. 92°Cc. 6°C
- d. 44°C

Answer: _____

20. Three angles have a common vertex, O.

 $\angle AOB$ and $\angle BOC$ are adjacent angles.

 \angle BOC and \angle COA are adjacent angles.

 \angle COA and \angle AOB are adjacent angles.

Which of the following combinations of angles could NOT occur?

- a. $\angle AOB$, $\angle BOC$ and $\angle COA$ are all obtuse angles.
- b. $\angle AOB$ is a straight angle; $\angle BOC$ and $\angle COA$ are both acute angles.
- c. $\angle AOB$ is a reflex angle; $\angle BOC$ and $\angle COA$ are both acute angles.
- d. $\angle AOB$ is a right angle; $\angle BOC$ and $\angle COA$ are both obtuse angles.

Answer: _____

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3	4	5	6	7	8	9	7	8	9	10	11	12	13	7	8	9	10	11	12	13
10	11	12	13	14	15	16	14	15	16	17	18	19	20	14	15	16	17	18	19	20
17	18	19	20	21	22	23	21	22	23	24	25	26	27	21	22	23	24	25	26	27
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6	0.8	14.	22	0:	28:0	C	E	.0	14:	21	0	28:0	0	1	5:0	12.	19	0:	26.0	C

21. What is the date 14 weeks after the 3rd of January?

- a. 4th April
- b. 11th April
- c. 9th May
- d. 21st March

Answer:	

- 22. In the storybook Kingdom of Quinta, \Im, Υ, \Im and ${}^{\odot}$ are symbols for numbers.
- ϑ is the number one.
- லி is two.

ඩබ් is three.

ରି ଶିର୍ଶ is four.

ରେ ଶର ଶାs written as [©].

ා වේ is six.

ාංගිම is written as රි.

 $\forall \forall \forall \forall \forall is written as \Upsilon$.

How did the Quintians write one hundred twenty-six?

- a. VN
- b. 594
- c. ૪ શ શ શ શ શ શ
- d. රු ඉෙද

Answer: _____

23. A train runs on a straight track from Firston to Laston through equally spaced stations.



Which station is three-quarters of the way from Firston to Laston?

- a. CASTON
- b. DUSTON
- c. EASTON
- d. FUNSTON

Answer:	
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24. Mr Brown had \$500 in his bank account before he paid bills of \$243, \$57 and \$350.

What was his bank balance after these bills were paid?

a. -\$1150 b. -\$150 c. +\$150

d. +\$1150

Answer:							

25. A builder reads the number 3000 for the height of a wall on a house plan.

What is this measurement with the correct units?

- a. 3000 centimetres
- b. 3000 metres
- c. 3000 millimetres
- d. 0.03 km

Answer: _____

The Answers.

Hey! No peeking until you've finished...



Question 1 Answer: d) 47 m

Looking at the table, we can see that the number of metres added to the total travelled is half the previous amount: After the 1st bounce: 16m is added; After the 2nd bounce: 8m is added; After the 3rd bounce: 4m is added. So, we can predict that after the 4th bounce, 2m would be added, bringing the total distance travelled to 46m, and **after the 5th bounce, 1m would be added, bringing the total distance travelled to 47m**.

Question 2

Answer: d) In all states the median age has increased since 1989.

Compare the information on the graph to each of the statements:

- The median age for the Northern Territory is above the median for Australia: The median for the NT ranges from about 26 in 1989 to about 31 in 2009, while the median for Australia ranges from about 32 in 1989 to 37 in 200, so this statement is FALSE.
- The median age in NSW increased by 10 years between 1989 and 2009: The median age in NSW in 1989 was about 32 in 1989 and about 37 in 2002, so this statement is FALSE.
- Queensland has the highest median age: Compared to the other states shown, New South Wales had the highest median age in 1989 and this was still the case in 2009, so this statement is FALSE.

In all states, the median age has increased since 1989: Information is not given for all Australian states (South Australia, Victoria and Tasmania are not listed); however, the median age has increased for New South Wales, Queensland and Western Australia and the Northern Territory, so this statement is TRUE (from the data provided).

Question 3

Answer: b) 20

Look at each of the calculations for the number of diagonals for the given shapes.

For the 4 sided shape, we multiply by 1 and then divide by 2.

For the 5 sided shape, we multiply by 2 and then divide by 2.

For the 6 sided shape, we multiply by 3 and then divide by 2.

So, it looks like we have to multiply the number of sides by the number of sides less 3, and then divide by 2:

1 is 3 less than 4, 2 is 3 less than 5, 3 is 3 less than 6.

Using this rule for an octagon, which has 8 sides, we would have:

 $8 \times 5 \div 2 = 20.$

We can also look at the pattern in the number of diagonals. Starting with the square, this goes:

25914

These numbers increase by 3, then 4 and then 5, so we would expect the next one to be 6 more than 14, which again, is 20.

So, we can conclude that an octagon would have 20 diagonals. (Try drawing a diagram to check.)

Question 4

Answer: Science

By looking at the axes, we can see that each mark represents 10% (on the vertical axis) or 10 marks (on the horizontal axis).

The dotted lines show where Sheena's scores in the two tests intersect with the graphs for the two subjects.

For science in which Sheena achieved 33/40, read across from the Science graph to the vertical axis. This is about halfway between 80% and 90%, so say 85%.

For Maths, Sheena's score of 65 equates to 70% on the vertical axis.

So, Sheena did quite a lot better in Science.

Question 5



The container with the heaviest amount of water will be the one with the largest amount of water, which might be measured in milliltres or litres. The containers are different shapes, but the amount of water in each is shown by the markings on the side. (These containers have markings that show lots of 50L, with marks in between these that would indicate increments of 25L.) In three of the containers, the water level is at 100L. In the other one, it is at 150L, so this is the container with the heaviest amount of water:



Question 6 Answer: a) 15

There are 360 degrees in a circle, so all the angles shown on the diagram must add up to 360 degrees.

β has the same value in every angle, so we can just work out how many lots of β we have. We have: 7β + 3β + 2β + 7β + 3β + 2β = 360degrees 24β = 360 degrees Now we divide both sides by 24 to find the value for βTherefore, β = 15 degrees

Question 7

Answer: a) No. 1

To find the amount that each person in each household uses (on average), we need to split up the total amount evenly amongst the number of people.

That means we will need to divide.

At house number 1, 4 people used 3000L.

So, each person used:

3000 ÷ 4 = 750L

At house number 3, 6 people used 4800L.

So, each person used:

4800 ÷ 6 = 800L

At house number 5, 2 people used 1700L.

So, each person used:

1700 ÷ 2 = 850L.

Finally, at house number 7, 3 people used 2500L.

So, each person used:

 $2500 \div 3 = 833L$ (rounded to the nearest L).

Therefore, the most economical household was house number 1, with 750L per person.

(In Australia, most local governments have imposed long term water restrictions of about 200L per person per day, so everyone in this street needs to be using a lot less water!)

Question 8



A whole pie chart is 100%, so a quarter is 25%. Therefore, toast & spread needs to take up one quarter of the pie chart.

Half a pie chart is 50%, therefore Wheetyflakes (60%) need to take up a bit more than half the circle.

An eighth (or half of a quarter) of the pie chart is 12.5%. Therefore, eggs need to take up slightly more than one eighth of the pie chart (or slightly more than a half of a quarter).

Question 9

Answer: a) 7

We know that:



So, we can substitute the cross + 5 from the second equation for the triangle in the first equation, giving us:



Then, if we subtract the cross from both sides, we would have:



Question 10 Answer: c) 1/8

We could work this out by looking at the diagram, or by adding the fractions and find what is needed to make one whole or one half of the whole. Looking at the diagram, we can see that the missing section could be covered by two of the 1/16 triangles. So, the missing square is 2/16 which is the same as 1/8.

We could also consider just the one half of the diagram in which the missing square is found:



In the red triangle, which is one half of the whole or 8/16, we already have:

? + 1/8 + 1/8 + 1/16 + 1/16 = 8/16? + 2/16 + 2/16 + 1/16 + 1/16 = 8/16? = 8/16 - 6/16? = 2/16So, the missing square is the remaining 2/16 or 1/8.

Question 11 Answer: a) 7 groups with 4 left over

To work out how many groups or lots of 12 there are in 88, we need to do a division:

From the x 12 table, we know that 7×12 is 84, so there will be 7 lots of 12, and there will be a remainder of 4.

$$\begin{array}{r}
7 & \mathbf{r} & \mathbf{4} \\
12 & 8 & 8 \\
 & \underline{-8 & 4} \\
 & \underline{\mathbf{4}}
\end{array}$$

So, there will be **7 groups of 12 keys, with 4 keys not in groups** of 12. (On a piano, 3 of these are at the left end and 1 at the right end.)

Question 12

Answer: c) 2 x ξ + 3

We can factorise the numerator in this fraction: $\frac{6 \times \xi + 9}{3}$ The numerator has two terms:

6 x ξ and + 9

These two terms have a common factor of 3, so we can "factorise" the numerator like this:

Now, our whole fraction looks like this:

$$\frac{3\times(2\times\xi+3)}{3}$$

We can divide the numerator and the denominator by 3, leaving:

Question 13

Answer: Stage 5 will use 40 cards.

The number of cards in each stage is:

2, 7, 15, 26

From Stage 1 to Stage 2 is an increase of 5; from 7 to 15 is in increase of 8; and from 15 to 26 is an increase of 11. So, each time we are adding 3 more cards than we did the time before. (This is one pair of cards that we lean against each other, and one card that we lie across the top horizontally.) To create Stage 5, that means we will need to add 11 + 3, which is 14 cards, making a total of 26 + 14 = 40 cards.

Check that this is correct by imagining the new bottom level of the structure for Stage 5. We will add 5 pairs of cards, and 4 horizontal cards. That's: $5 \times 2 + 4 = 14$, so our prediction from the number pattern is correct.

Question 14 Answer: c) 40% Paul scored 7 or more on 8 out of his 20 turns. Written as a fraction this is 8/20.

To change this to a percentage, we can simply change it to an equivalent fraction out of 100, because 20 is a factor of 100.

We need to multiply the numerator and denominator by the same factor to make the equivalent fraction. To change the denominator from 20 into 100 we need to multiply it by 5. If we multiply the denominator by 5, we must multiply the numerator by 5 also.

Numerator: 8 x 5 = 40

Denominator: 20 x 5 = 100

Therefore, the final fraction is 40/100

Remember that a percentage is just a fraction out of 100, so

40/100 = 40%.

Paul scored 7 or more on 40% of his turns.

Another way of changing fractions to percentages:

This can be done by simply multiplying the numerator by 100%, as we are taking that fraction of 100%:

So with the original fraction of 8/20, we could do this:

(8 x 100%) / 20

= 800% / 20

= 40%

Question 15

Answer: b) The estimate will be below the actual cost.

The exact answer is 597 x \$9.05 = \$5402.85

The estimate is 600 x \$9 = \$5400.

So the estimate is **below** the actual cost, but not by much. It is \$2.85 lower.

Question 16 Answer: d) One fifth of five eighths

Write each operation as a multiplication, using digits. The basic process for multiplying fractions is to multiply the numerators, multiply the denominators and then simplify the answer, if possible. Sometimes, we can simplify before we multiply by dividing the top and bottom by common factors.

One fifth of five eighths becomes:

¹/₅ x ⁵/₈

We can divide the top and bottom by 5, leaving:

 $= \frac{1}{8}$

One half of three quarters becomes:

 $\frac{1}{2} \times \frac{3}{4}$ = $\frac{3}{8}$

One eighth of seven becomes:

 $\frac{1}{8} \times \frac{7}{1}$ = $\frac{7}{8}$

One third of six eighths becomes:

¹/₃ x ⁶/₈

We can divide the top and bottom by 3, leaving:

 $= \frac{2}{8}$

 $= \frac{1}{4}$

So, the smallest number is 1/8, given by "one fifth of five eighths".

Question 17

Answer: d) 25

In a quadrilateral, the sum of angles is 360°. Therefore,

z° = 360° - 145° - 60° - 48° z° = 360° - 253°

z° = 107°

Now, we can use the supplementary rule for parallel lines. If a single line crosses two parallel lines, the sum of the internal angles equal 180°. This means that:

x + y + 48° + z° = 180° x + y + 48° + 107° = 180° x + y = 180° - 48° - 107° x + y = 180° - 155° x + y = 25°

Question 18



Imagine looking at the solid from the left, and try to imagine a wide blade coming down through the solid, but not through the centre.

The shape has been "sliced" through to one side of the centre, so the crosssection will not come to a point at the top.

Because of the curving surfaces of both the cone and the hemisphere, the face made by the slice will change smoothly in a curved manner, rather than have distinct angles or points.

The yellow section will only be as high as the dotted line extends, and likewise, the green section at the bottom won't be quite as deep as the hemisphere. So, the correct illustration of this cross-section is:



Question 19 Answer: c) - 6°C

To find the temperature in Moscow if it is 44 degrees colder than the 38 degrees in Adelaide, we will need to subtract 44 from 38. This will give a negative number.

Look at the diagram of a thermometer below to see how this will work:



Starting at 38, subtracting 38 degrees will bring us down to 0 degrees C.

We need to subtract a further 6 degrees (to reduce the temperature by a total of 44 degrees). This brings us down to -6 degrees C. So, 38 - 44 = -6The temperature in Moscow would be -6 degrees C.

Question 20 Answer: b) $\angle AOB$ is a straight angle; $\angle BOC$ and $\angle COA$ are both acute angles.

This diagram shows one possible configuration for the 3 angles:



In this one angle AOB is acute, angle BOC is acute and angle COA is a reflex angle.

Now, consider each of the choices and try to draw them. You will find that you cannot actually draw the angles such that:

\angle AOB is a straight angle; \angle BOC and \angle COA are both acute angles.

Once you have a straight line (angle AOB), any two angles made from point O on that line must also add up to 180. If one of them is less than 90 degrees (acute), the other one would be greater than 90 degrees (obtuse), as shown below:





From the calendar, we can see that 3rd January falls on a Sunday. One week later, it will be Sunday 10th January.

To find the date 14 weeks after 3rd January, simply make 14 "hops" down the Sunday column.

4 weeks will bring you to 31 January; another 4 weeks will make it 28 February; 4 more and it will be 28 March. That's 12 weeks so far, so we need to go 2 more weeks, which will bring us to 11 April.

So, the date 14 weeks after 3rd January is 11th April.

Question 22 Answer: a) $\gamma \delta$

Starting with the ϑ , we can work out that \mathfrak{S} is equal to 5 (5¹).

ee is 5 lots of the symbol for 5, so this symbol represents 25 (5²).

 γ is 5 lots of the symbol for 25, so this one represents 125 (5 $^{\rm 3}$).

So, 126 would be represented by: $\Upsilon \mathfrak{A}$

Question 23 Answer: d) FUNSTON

From Firston to Laston, there are 8 equal sections of track, marked by the stations, so each station indicates 1/8 of the track.

3/4 is the same as 6/8, so we need to find the 6th station after Firston. This is Funston.

Funston is 3/4 or 6/8 of the way along the track.

Question 24 Answer: b) -\$150

If we add together all of Mr Brown's bills we have: \$243 + \$57 + \$350 = \$650. This is MORE than he has in his account, so his balance will become negative. (His account will be "overdrawn".) \$500 - \$650 = - \$150 **His balance will be -\$150.**

Question 25 Answer: c) 3000 millimetres

We measure distances (including heights) using millimetres, centimetres, metres and kilometres.

Let's look at each of the choices and find the one that makes sense for the height of a house wall.

0.03 km: There are 1000 m in 1 km, so to change this to metres, we need to multiply by 1000:

0.03 x 1000 = 30m.

If you are about 1.5m tall, then 30m would be 20 times your height. That's a lot taller than the walls in a house.

3 000 m: That's even bigger than 0.03 km.

3 000 cm: There are 100 cm in 1 m, so 3 000cm = 30 m, the same as 0.03km.

3 000 mm: There are 1000 mm in 1 m, so 3000 mm = 3 m. That's probably about twice as tall as you are, and that makes sense for the height of a house wall.

(Although mm are small units of measurement and it might seem strange to use them for measurements on buildings, we do that to make sure all measurements are in whole numbers.)