2011

GRADE 6

MATHEMATICS

EXEMPLAR ITEMS
(ENGLISH)

TEACHER’S GUIDE
INSTRUCTIONS TO TEACHERS

1. The provincial test covers all five learning outcomes. There are easier items and more difficult items in the test.

2. The exemplar items are provided so that the learners can become familiar with the type of items asked. In these example items there are both multiple choice and constructed response type questions.

3. These items also give you an idea of the difficulty level of the items in the test.

4. There are three sets of items that are grouped together as they involve the same concepts.

5. These items may be used exactly as they are. You might also like to change the items, that make the items easier or more difficult, by:
   - changing the context, for example changing an athletic field to a race-track;
   - changing the number range from a low number range to higher number range;
   - changing the type of situation, for example change the components of the problem, $35 \times 25 = \ldots$ to $35 \times \ldots = 875$
   - changing the type of question from multiple choice type questions to constructed response type questions.

6. Encourage learners to express their reasoning, and to compare the similarities and differences between fraction notation, decimal notation and percent notation.

7. Some problems are best explored through drawings and diagrams.
Exemplar items: Set A

This exemplar set includes the concept of place value, fractions, decimal fractions and percent. We suggest that you discuss the concepts involved beforehand, during the class activity and after the class activity. The items increase in difficulty. The more difficult items require more support from the teacher.

1. What is the value of the 3 in this number?

```
6 309
```

<table>
<thead>
<tr>
<th>a. 3</th>
<th>b. 300</th>
</tr>
</thead>
<tbody>
<tr>
<td>c. 30</td>
<td>d. 3 000</td>
</tr>
</tbody>
</table>

(1)

How to answer this question:
This is a multiple choice type question. Ignore the options given and calculate the answer to the question. If your answer matches a given option, mark that as the correct answer. If not, start over to see where you made an error. DON’T GUESS!!

The 3 represents the hundred (100) position, therefore its value is 300.

Circle the correct answer:  

Variations to the question (for classroom use):
Give different numbers and ask values of different positions.

Difficulty level (Gr 6): Easy
2. Use your pencil to shade in 0,5 of the shape below.

How to answer this question:
First of all count the blocks: There are 10 blocks in this shape, therefore each block represents one-tenth of the whole, or in decimal notation 0,1 of the whole which is 1. Two of the blocks represent 0,2.

Determine 0,5 or \( \frac{1}{2} \) of the shape.

Answer: 5 (any 5) of the 10 blocks can be shaded, e.g.:

Or

Or

Variations to the question (for classroom use):
Use different decimal fractions.
Use different shapes with a different number of blocks, etc.

Difficulty level (Gr 6): Easy
3. The teacher wrote this pattern on the board.

1,10; 1,15; 1,20; ______; ______

If this same pattern continues, what numbers should the teacher write in the blank spaces?

a. 125; 130  
b. 12,5; 12,0  
c. 1,25; 1,30

(1)

**How to answer this question:**

This is again a multiple choice type question. Ignore the options given and calculate the answer to the question. If your answer matches a given option, mark that as the correct answer. If not, start over to check where you made an error. DON'T GUESS!!

Determine the relation between the first 2 numbers:

1,15 − 1,10 = 0,05

Determine the relation between the next 2 numbers:

1,20 − 1,15 = 0,05

There is therefore a constant difference between consecutive numbers, namely: 0,05.

To get to the next numbers in this pattern, add 0,05 to the previous number:

1,20 + 0,05 = 1,25 and 1,25 + 0,05 = 1,30

Answer:  c  1,25; 1,30

**Variations to the question** (for classroom use):

Give different decimal numbers with constant differences in the pattern.

**Difficulty level** (Gr 6): Moderate
4. Use your pencil to shade in **20%** of the table.

How to answer this question:

First of all count the blocks:  
Encourage learners to calculate the number of blocks by multiplying the number of rows with the number of columns. There are 100 blocks (10 rows and 10 columns).

Determine 20% or \(\frac{20}{100}\) or \(\frac{1}{5}\) of the table.

\[
\frac{20}{100}\text{ of } 100 = 20
\]

Answer: 20 (any 20) blocks can be shaded, e.g.:

![Shaded examples]

and many more possibilities.

Variations to the question (for classroom use):
Different percentages.  
Different shapes with a different number of blocks, etc.

**Difficulty level** (Gr 6): Easy
5. This is the normal price of shirts at Pip Stores.

**T-shirt**
Price: R80

**Long-sleeve shirt**
Price: R90

The T-shirt is on sale for a \( \frac{1}{4} \) of its normal price. The long-sleeve shirt is on sale for a \( \frac{1}{3} \) of its normal price.

Which shirt will be cheaper on the sale? Show your working.

How to answer this question:
Work out the sales price of the T-Shirt and long-sleeve shirt separately:

T-shirt:
\[
\frac{1}{4} \times R80,00 = R20,00
\]

Long-sleeve shirt:
\[
\frac{1}{3} \times R90,00 = R30,00
\]

Compare R20,00 to R30,00.

Conclusion: The sales price of the T-shirt is R10,00 cheaper than the sales price of the long-sleeve shirt

Answer: The T-shirt is cheaper on the sale.

Variations to the question (for classroom use):
Change the prices of the products.
Change the products (e.g. shoes and sandals, etc.).
Change the fractions, etc.

Difficulty level (Gr 6): Moderate
Exemplar items: Set B

This Exemplar set includes the concepts of length, speed and conversions. There is also an item where the problem is to show the rule which connects two sets of items. These problems are best explored through drawings and diagrams.

1. Angela runs a 5 km race. How many metres had she run when she reached this sign?

How to answer this question:

First of all we see that the units given (km) differ from the units in the question asked (metres). Change to the same units and “translate” the question:

e.g. Angela runs a 5 000 m race. How many metres had she run when she reached this sign: Keep going! You have only 1 000 metres to go.

This is a subtraction question:

\[ 5000 \, m - 1000 \, m = 4000 \, m \]

You can also make a drawing of the situation:

Answer: They have asked the answer in metres, therefore the answer is: 4 000 m

Variations to the question (for classroom use):

Change the distances (numbers in the question).
Convert the units from mm to cm to m to km, etc.

Difficulty level (Gr 6): Moderate
2. Write down the rule for the following:

\[
\begin{align*}
6 & \quad 42 \\
7 & \quad 49 \\
5 & \quad 35 \\
9 & \quad 63
\end{align*}
\]

How to answer this question:

The learners will certainly have their own ideas on how to answer this question. The following approach may be encouraged.

Consider the first 2 numbers: 6 and 42. Look for obvious relations between the numbers:

\[
\begin{align*}
a) & \quad 6 + 36 = 42 \text{ and } \quad b) \quad 6 \times 7 = 42 \\
\end{align*}
\]

Apply these rules to the next number:

\[
\begin{align*}
a) & \quad 7 + 36 = 43 \text{ NO and } \quad b) \quad 7 \times 7 = 42 \text{ YES} \\
\end{align*}
\]

Apply the rule that worked on all the remaining numbers to see if it works for them.

\[
\begin{align*}
5 \times 7 = 35 \text{ YES} \quad 9 \times 7 = 63 \text{ YES}
\end{align*}
\]

We can now conclude by saying: The rule is: \( \times 7 \) (multiplication by 7)

Answer: \( \times 7 \)

Variations to the question (for classroom use):

Change the numbers;
Change the relations (rules), etc.

Difficulty level (Gr 6): Easy
3. A car takes 6 hours to travel from Johannesburg to Durban. The distance travelled is 600 km. How many kilometres per hour does the car travel?

__________________________

How to answer this question:

Use the formula:

\[
s (\text{speed}) = \frac{D (\text{distance})}{t (\text{time})}
\]

\[\therefore s = \frac{600 \text{ km}}{6 \text{ h}}\]

\[= 100 \text{ km/h}\]

Answer: 100 km/h.

Variations to the question (for classroom use):

Give distance and speed and ask the time taken; give speed and time and ask distance. Variables and distractors can also be changed.

Give real world speeds such as 60 km/h; 80 km/h and 120 km/h for cars.

Bicycle speed ±30 km/h; run at ±10 – 12 km/h and walk at ±5 km/h.

Also give ‘silly’ speeds such as 240 km/h. (Did you know that on the autobahns in Germany there is no speed limit? But plenty of accidents!)

Difficulty level (Gr 6): Moderate
Exemplar items: Set C

1. How many of these triangular tiles will you need to fully tile this parallelogram shape?

_________ triangles

How to answer this question:
The best way to answer this question is to do it practically by cutting the triangles and placing (tile) it on the bigger parallelogram shape.
If you don’t have the resources to physically cut triangles and paste it on the parallelogram, you can measure the length of the triangle’s sides to see how many will fit into the length and breadth of the parallelogram.

It can be demonstrated like this:

Answer: 12 triangles.

Variations to the question (for classroom use):
Give different shapes as tiles (e.g. squares, rhombuses, etc) to tile on different shapes (e.g. rectangles, trapeziums, etc.).

Difficulty level (Gr 6): Moderate
2. Calculate the area of this shape.

\[ \text{Area} = (4 \times 6) + (2 \times 2) \]
\[ = 24 + 4 \]
\[ = 28 \text{ cm}^2 \]

How to answer this question:
This shape could be broken down into shapes with known formulas to determine the area (e.g. rectangles and squares):

- \[ \text{Area} = (1 \times b) + (1 \times b) \]
  \[ = (4 \times 6) + (2 \times 2) \]
  \[ = 24 + 4 \]
  \[ = 28 \text{ cm}^2 \]

- \[ \text{Area} = (1 \times b) \]
  \[ = (2 \times 6) + (2 \times 8) \]
  \[ = 12 + 16 \]
  \[ = 28 \text{ cm}^2 \]

- \[ \text{Area} = (1 \times b) - (1 \times b) \]
  \[ = (4 \times 8) - (2 \times 2) \]
  \[ = 32 + 4 \]
  \[ = 28 \text{ cm}^2 \]

And many more shapes.
Answer: 28 cm²

Variations to the question (for classroom use):
Use different right-angled combined shapes.
Change the dimensions of the shapes.

Difficulty level (Gr 6): Moderate
3. Calculate the volume of this rectangular prism.

\[
\begin{array}{c}
10 \text{ cm} \\
5 \text{ cm} \\
15 \text{ cm}
\end{array}
\]

\[V = \text{length} \times \text{breadth} \times \text{height}
= \ell \times b \times h\]

Substitute the values:
\[V = 15 \text{ cm} \times 5 \text{ cm} \times 10 \text{ cm}
= 750 \text{ cm}^3\]

Answer: 750 cm\(^3\)

**Variations to the question** (for classroom use):
Use a rectangular prism with different dimensions.
Give the volume and 2 other dimensions (e.g. length and breadth) and ask the missing dimension (height).

**Difficulty level** (Gr 6): Moderate