basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

ANNUAL NATIONAL ASSESSMENT 2014

GRADE 9

MATHEMATICS EXEMPLAR QUESTIONS

This booklet consists of 16 pages, excluding the cover page

GUIDELINES FOR THE USE OF ANNUAL NATIONAL ASSESSMENT (ANA) EXEMPLARS QUESTIONS

1. How to use the exemplar questions

While the exemplar questions for a grade and a subject have been compiled into one comprehensive set, **the learner does not have to respond to the whole set in one sitting**. **The teacher should select exemplar questions that are relevant to the planned lesson at any given time**. Carefully selected individual exemplar questions, or a manageable group of questions, can be used at different stages of the teaching and learning process as follows:

1.1 At the beginning of a lesson as a diagnostic test to identify learner strengths and weaknesses. The **diagnosis** must lead to prompt **feedback** to learners and the development of **appropriate lessons** that address the identified weaknesses and consolidate the strengths. The diagnostic test could be given as homework to save instructional time in class.

1.2 During the lesson as short formative tests to assess whether learners are developing the intended knowledge and skills as the lesson progresses and ensure that no learner is left behind.

1.3 At the completion of a lesson or series of lessons as a summative test to assess if the learners have gained adequate understanding and can apply the knowledge and skills acquired in the completed lesson(s). Feedback to learners must be given promptly while the teacher decides on whether there are areas of the lesson(s) that need to be revisited to consolidate particular knowledge and skills.

1.4 At all stages to expose learners to different techniques of assessing or questioning, e.g. how to answer multiple-choice (MC) questions, open-ended (OE) or free-response (FR) questions, short-answer questions, etc.

While diagnostic and formative tests may be shorter in terms of the number of questions included, the summative test will include relatively more questions, depending on the work that has been covered at a particular point in time. It is important to ensure that learners eventually get sufficient practice in responding to the exemplar questions.

2. Memoranda or marking guidelines

A typical example of the expected responses (marking guidelines) has been given for each exemplar question. Teachers must bear in mind that the marking guidelines can in no way be exhaustive. They can only provide broad principles of expected responses and teachers must interrogate and reward acceptable options and variations of the acceptable response(s) given by learners.

3. Curriculum coverage

It is extremely critical that the curriculum must be covered in full in every class. The exemplar questions for each grade and subject do not represent the entire curriculum. They merely **sample** important knowledge and skills and covers work relating to terms 1, 2 and 3 of the school year.

The questions start on the next page.

1. MULTIPLE CHOICE QUESTIONS

Practice question

Circle the letter of the correct answer.

4 × 3 + 2 × 3 =

A 4 × 5 × 3

B 3(4 + 2)

C 6 × 3

D 3(4 × 2)

You have done correctly if you circled **B**.

1.1 What is the y-intercept of the graph defined by $4x + 2y = 12$?

A -4

B -2

C 6

D 12

1.2 Which one of the following numbers has the same value as $5^{6} \times 5^{-2}$?

A 5^{-12}

B 5^{-3}

C 5^{4}

D 5^{8}

1.3 In rectangle $ABCD, AB = 8\ cm$ and diagonal $AC = 10\ cm$. Calculate the length of AD.

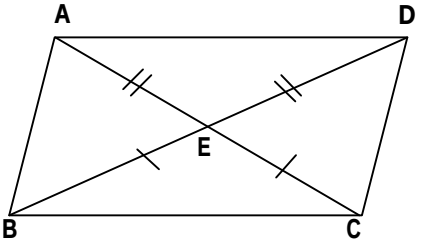
A $2\ cm$

B $6\ cm$

C 12,8 cm

D 14 cm

1.4 In the given quadrilateral $AE = ED \; and \; BE = EC$, therefore:



A $\Delta AEB \; ||| \; \Delta CED$

B $\Delta AED \; ||| \; \Delta BEC$

C $\Delta AEB \equiv \Delta DEC$

D $\Delta AED \equiv \Delta BEC$

1.5 What is the size of each angle in a regular hexagon?

A 90°

B 120°

C 100°

D 108°

1.6 Complete:

$\sqrt{17^2 - 8^2}$ =

A 9

B 3

C 15

D 225

1.7 Complete:

$3^{-1} + 5^{-1}$ =

A 8^{-1}

B 8^{-2}

C $\frac{2}{8}$

D $\frac{8}{15}$

1.8 If x^2 = 25 then x =

A 5

B 625

C 5 or -5

D -5

1.9. If the length of the side of a square is 0,012 cm, the area =

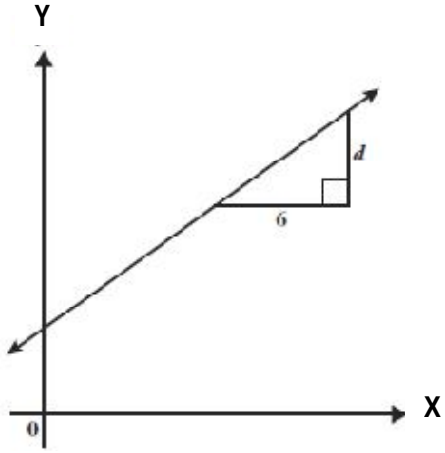
A 0,024 cm^2

B 0,0144 cm^2

C 1,44 cm^2

D 0,000144 cm^2

1.10



The gradient of the line shown above is $\frac{2}{3}$. What is the value of d?

A 3

B 4

C 6

D 9

2. NUMBERS, OPERATIONS AND RELATIONSHIPS

2.1.1 Write $6{,}7 \times 10^{-3}$ in standard form.

2.1.2 Write $0{,}00000356\ kl$ in scientific notation.

2.1.3 Arrange the following numbers in ascending order of size.

$2\sqrt{2}\ ,8\ ,\ 2{,}7$

2.1.4 Arrange the following numbers in descending order of size.

$-3\sqrt{3}\ ,-16\ ,-5{,}25$

2.1.5 Between which two natural numbers does $\sqrt{13}$ lie?

2.2 Simplify:

2.2.1 $0{,}125 \div \sqrt{25}$

2.2.2 $\left(2\frac{1}{2}\right)^2 + (0{,}5)^2$

2.2.3 $\left(\sqrt{144 + 25} + 3\sqrt{25}\right) \div (\sqrt{2})^2$

2.2.4 $\sqrt[3]{10^3} \times \sqrt{0{,}01}$

2.3 There are 96 boys and 120 girls in Grade 9. Write down, in the simplest form, the ratio of the number of boys to the number of girls in the grade.

2.4 Simplify the ratio R250: R150: R100.

2.5 Write the ratio $1\frac{2}{3} : 2\frac{2}{3}$ in the simplest form.

2.6 Divide 240 g in the ratio 5 : 3 : 4.

2.7 Decrease R1 250 in the ratio of 2 : 5.

2.8 Increase 280 in the ratio 5: 2.

2.9 How long will it take for an investment of $R3\,000$ at 8% per annum simple interest to earn $R960$ interest?

2.10 Calculate the interest if $R6\,500$ is invested for 3 years at 7,5% per annum compound interest.

2.11 Calculate what $R10\,000$ will amount to if it is invested at 10% per annum compound interest for 3 years.

2.12 A bus driver covers a certain distance in 3 hours at an average speed of 80 km/h. How long will the journey take at an average speed of 50 km/h?

2.13 A 3,5 m-long stick casts a shadow that measures 5,2 m on the ground What is the height of a flagpole that casts a 29,2 m-long shadow?

3. PATTERNS, FUNCTIONS AND ALGEBRA

3.1 Simplify:

3.1.1 $(2x)^2 + 3x^2$

3.1.2 $(a^2\ b^3)^2.\ ab^2 - (ab)^5$

3.1.3 $\frac{5a^2b}{3ab} \div \frac{20a^3b}{27}$

3.1.4 $2x^{-2} \times \frac{x^3}{2^2}$

3.1.5 $\frac{4x^{-2}}{(4x)^{-2}}$

3.1.6 $\frac{x^2+2x}{x^3-2x} \div \frac{x^2-4}{x-2}$

3.1.7 $\frac{x-2}{2x} - \frac{x-3}{3x}$

3.1.8 $\frac{3a^{-2}b \times 24ab}{9a^2b^{-2}}$

3.1.9 $\frac{x^2-1}{3x+3}$

3.2 Multiply and simplify if necessary.

3.2.1 $3a^2bc^2\,(3a^2 - 4b - c)$

3.2.2 $(2x - 3)\,(x + 1)$

3.2.3 $(x - 3)^2 - x(x + 4)$

3.3 Factorise fully:

3.3.1 $10t^2 - 5t$

3.3.2 $81 - 100a^2$

3.3.3 $2(x + y) + a(x + y)$

3.3.4 $6x^3\,(a - b) + x\,(b - a)$

3.3.5 $4(a + b) - x^2(a + b)$

3.3.6 $x^2 + 5x + 6$

3.3.7 $2a^2 - 18a + 36$

3.4 Solve for x:

3.4.1 $2x - 5 = 5x + 16$

3.4.2 $x - \frac{x-1}{2} = 3$

3.4.3 $\frac{x-2}{4} + \frac{2x+1}{3} = \frac{5}{3}$

3.4.4 $(x - 3)(x + 4) = 0$

3.4.5 $x^2 - 1 = 0$

3.4.6 $3^{x+1} = 81$

3.4.7 $x^3 = -27$

3.4.8 $2^x = \frac{1}{64}$

3.5 Answer the following substitution questions.

3.5.1 Calculate the value of $2x^3 - 3x^2 + 9x + 2 \; if \; x = -2$.

3.5.2 If $a = 2$, $b = -3$ and $c = -\frac{1}{2}$, find the value of $\frac{5ac}{b}$.

3.5.3 If $x = 2$ and $y = -3$, calculate the value of $3x^2 - 2xy - y^2$.

3.5.4 If $x = -2$, calculate the value of $2 \times 3^{1-x}$.

3.6 A tiler creates the following patterns with black and white tiles:

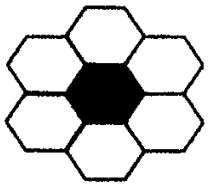


Figure 1

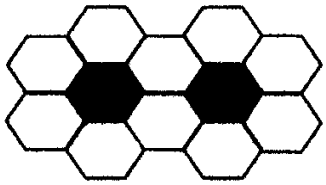


Figure 2

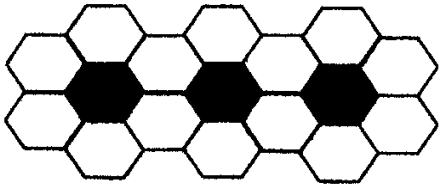


Figure 3

3.6.1 Study the above diagram pattern and complete the table.

Figure	1	2	3	4
Number of black tiles	1	2	3	4
Number of white tiles	6			

3.6.2 Write down the general term, T_n, of the number sequence created by the black and white tiles.

3.7 Consider the array of dots in the following diagram:

Array 1 Array 2 Array 3 Array 4

3.7.1 What kind of numbers are shown in the above dot arrays?

3.7.2 How many dots are there in the n^{th} and 20^{th} dot arrays if the pattern is continued?

3.8 Use the given equation to complete each of the following tables.

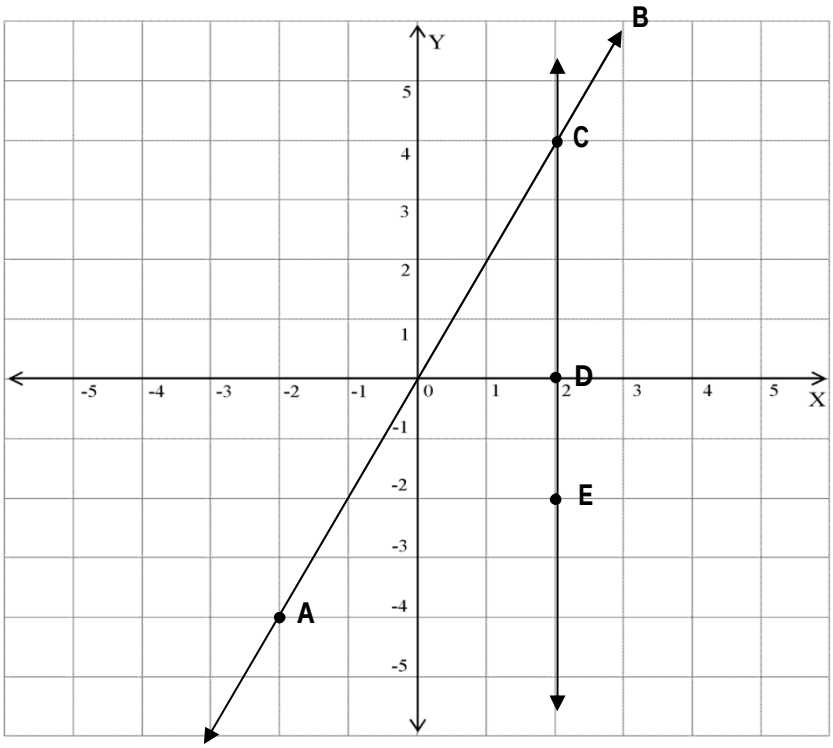
3.8.1 $y = 3x - 5$

x	-2	-1	0	1
y				

3.8.2 $y = -\frac{2}{3}x - 1$

x	-3	-1	0	1
y				

3.9 Study the straight line graphs below and answer the questions that follow.



Complete:

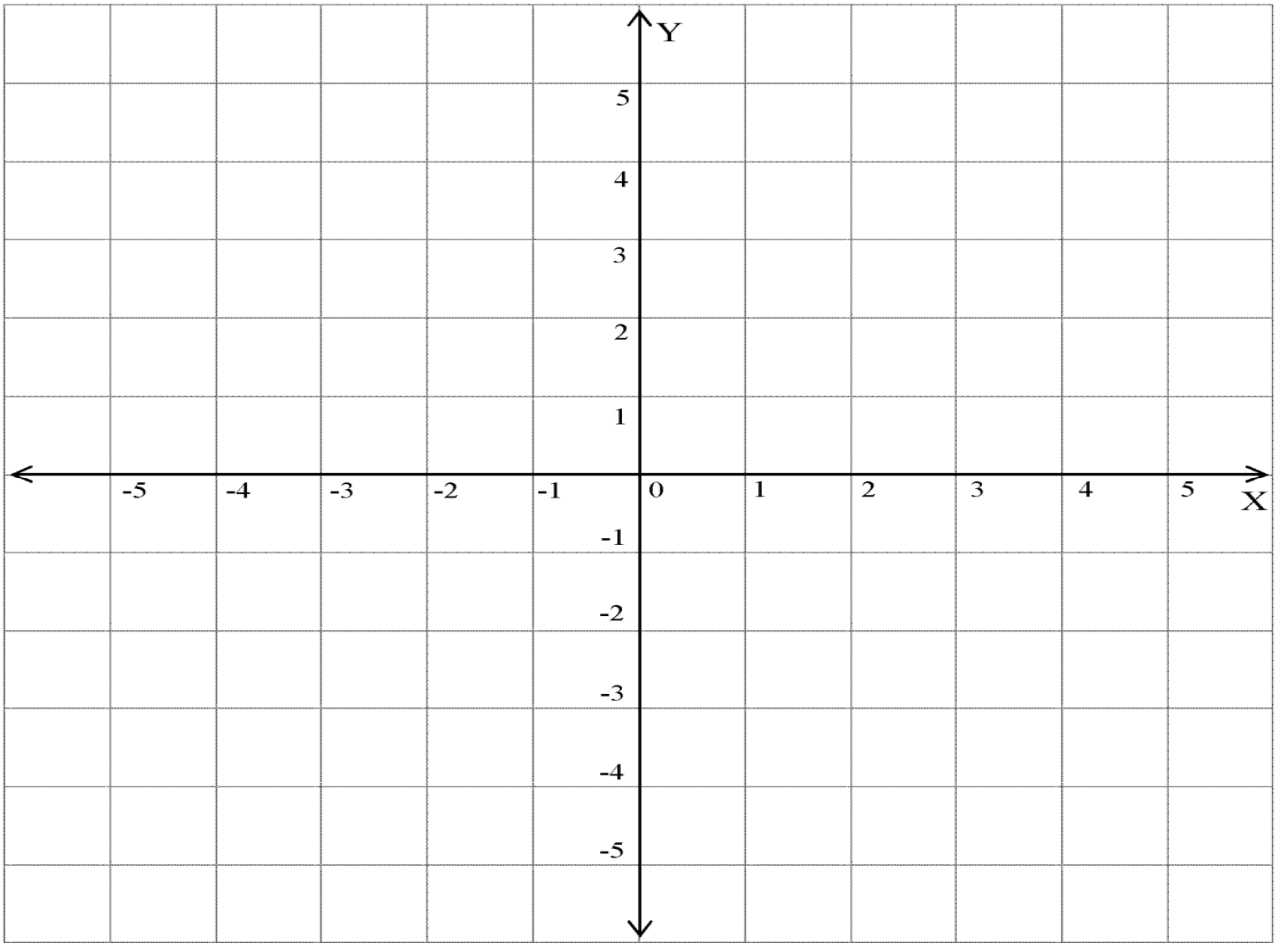
3.9.1 The equation of line CD is …

3.9.2 The equation of line AB is …

3.9.3 The length of CE = …

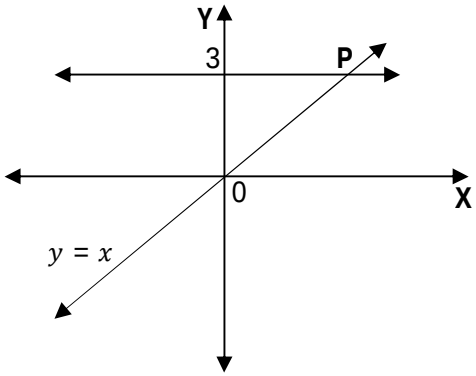
3.10.1 On the given grid draw the graphs defined by $y = -\frac{2}{3}x + 1$ and $y = \frac{3}{2}x - 1$.

Label each graph and clearly mark the points where each graph cuts the X-axis and the Y-axis.

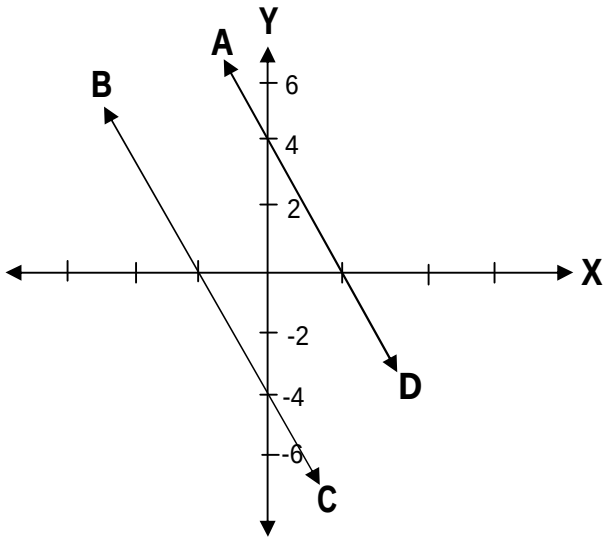


3.10.2 What is the relationship between the lines that you have drawn?

3.11 Determine the co-ordinates of P in the graph below.



3.12.1 Write down the defining equation of each of the following straight line graphs.



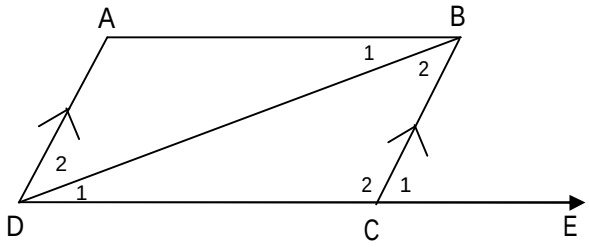
3.12.2 What can you deduce about lines AD and BC? Give a reason for your answer.

4. SPACE AND SHAPE

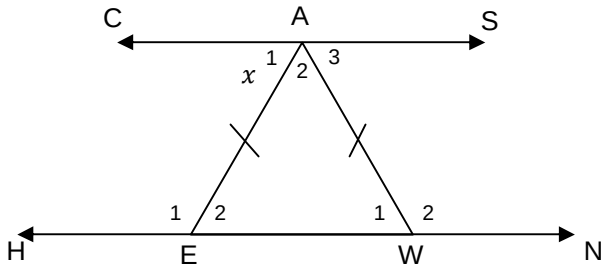
Answer QUESTIONS 4.1 - 4.6 in a table using the following headings. Redraw the table.

Statement	Reason

4.1 Calculate the values of x and y if $\hat{B}_2 = x$, $\hat{D}_2 = y$, $\hat{D}_1 = 44°$, $\hat{C}_1 = 75°$ and AD||BC.



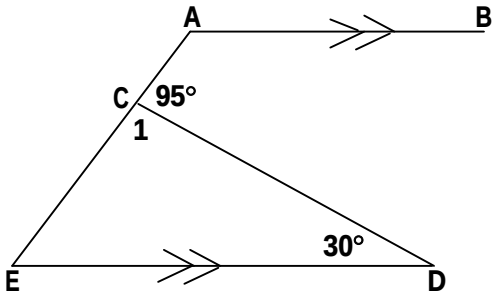
4.2



In the above figure, CS || HN, $\hat{A}_2 = 70°$, $AE = AW$ and $\hat{A}_1 = x$.

Determine the value of x.

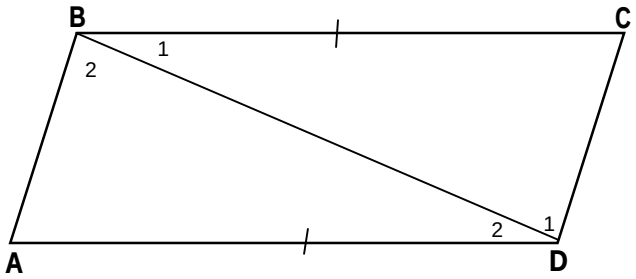
4.3



In the above figure $AB||ED$, $A\hat{C}D = 95°$ and $\hat{D} = 30°$.

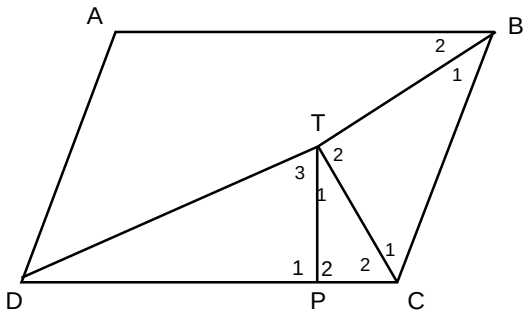
Determine the size of $\hat{E}$ and $\hat{A}$.

4.4 In the figure below $\hat{D}_1 = \hat{B}_2 = 90°$ and $AD = BC$.



Prove that $\Delta ABD \equiv \Delta CDB$.

4.5



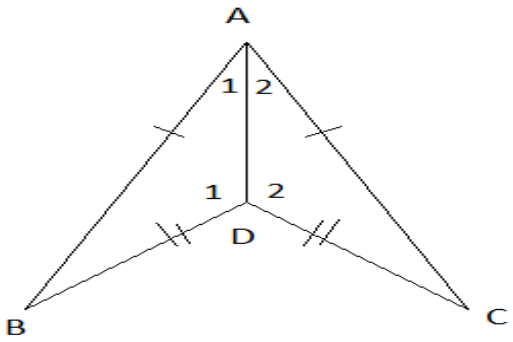
The bisectors of $\hat{B}$ and $\hat{C}$ of parallelogram $ABCD$ intersect at T. Points B, T and D do not lie on a straight line. P is a point on DC such that $T\hat{P}D = 90°$.

4.5.1 Prove that $\hat{T}_2 = 90°$.

4.5.2 Prove that $\Delta BCT \,|||\, \Delta TCP$.

4.5.3 If $BC = 2TC$ and $TP = 4\ cm$, calculate the length of BT.

4.6



In the above figure, $AB = AC$ and $BD = CD$.

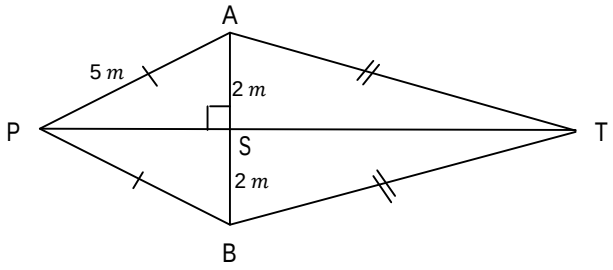
4.6.1 Prove that $\Delta ABD \equiv \Delta ACD$

4.6.2 Prove that DA bisects $B\hat{A}C$.

5. MEASUREMENT

5.1 A ladder is standing against a wall. If the ladder reaches a height of 12 m up the wall. If the foot of the ladder is foot 5 m away from it, calculate the length of the ladder.

5.2 In the figure below, $AP = 5\,m, AS = SB = 2\,m$ and $PS \perp AB$.



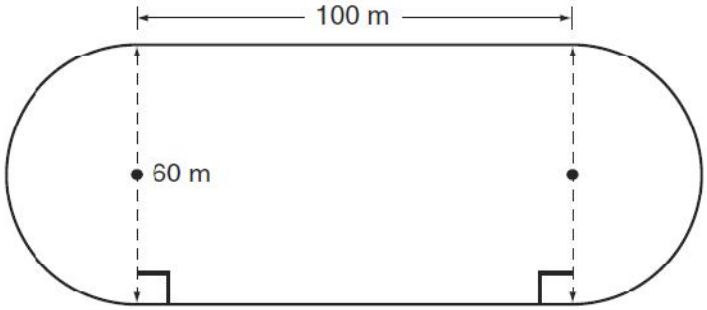
5.2.1 Calculate the length of PS correct to 2 decimal places.

5.2.2 Calculate the length of PT if $PT = 3 \times AB$

5.2.3 What kind of quadrilateral is $APBT$?

5.2.4 Calculate the area of the figure correct to 2 decimal places.

5.3 Peter runs around the field with the following dimensions:



5.3.1 How many times must he run around the field in order to run a distance of at least 4 km? Use π = 3,14.

5.3.2 Calculate the area of this field.