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Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA



NATIONAL SENIOR CERTIFICATE

GRADE 10

MATHEMATICS

COMMON TEST

JUNE 2021



MARKS: 50

TIME: 1 hour

This question paper consists of 4 pages.

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 3 questions.
2. Answer ALL the questions.
3. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.
4. Answers only will NOT necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round off answers correct to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. Write neatly and legibly.



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QUESTION 1

Stanmorephysics.com

1.1 Consider the following number sequences: $-14;\ -17\ ;\ -20\ ;\ -23\ ;\ ...$

1.1.1 Write down the next TWO terms in the sequence. (2)

1.1.2 Complete the table below, by determining the values of a, b and c.

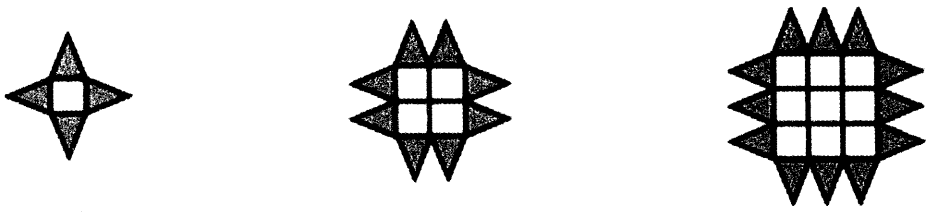
n	1	2	3	***a***	14	50
T_n	– 14	– 17	– 20	– 32	***b***	***c***

(3)

1.1.3 Write down the general term, T_n, of the sequence. (2)

1.2 A sequence of patterns is made from square tiles and triangular tiles. Below are the first three patterns in the sequence.

Pattern 1 Pattern 2 Pattern 3



1.2.1 Determine how many square tiles are required for pattern 10. (2)

1.2.2 Calculate how many triangular tiles are required for pattern 24. (3)

[12]

QUESTION 2

2.1 If $\hat{A}=40°$ and $\hat{B}=19°$, use a calculator to evaluate, correct to TWO decimal places, the following: $\cot\hat{B}-\sec\hat{A}$. (2)

2.2 Given: $17\sin\theta+8=0$ and $90°\le\theta\le270°$, determine with the aid of a diagram, and **without the use of a calculator**, the value of:

2.2.1 $\cos^2\theta$ (4)

2.2.2 $2\tan\theta-\cos ec\theta$ (3)

2.3 Solve for x (correct to TWO decimal places) if:

$$3\cos(3x+10°)-1=0\ ,\ x\in[0°;90°].$$ (4)

2.4 Without the use of a calculator, showing all working, determine the value of:

$$\sin 90°+\tan^2 45°+\sqrt{2}\cos 45°$$ (3)

[16]

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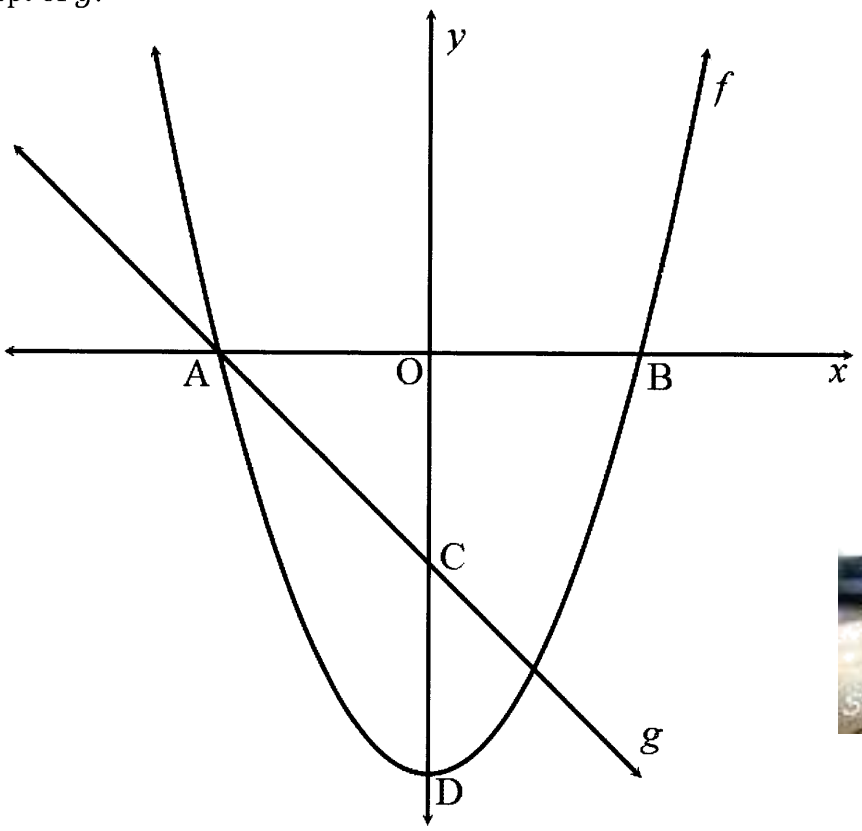
QUESTION 3

The graphs of $f(x)=\frac{1}{2}x^2-8$ and $g(x)=-x-4$ are given.

A and B are x- intercepts of the graph of f, and D is the turning point of f.

The graph of g meets f at B and E.

C is the y-intercept of g.





3.1 Determine:

3.1.1 the coordinates of A, B, C and D. (8)

3.1.2 the length of CD. (2)

3.1.3 the equation of $k(x)$, if $k(x)=-f(x)$ (2)

3.2 The following functions are given: $f(x)=\frac{2}{x}+2$ and $h(x)=2^x+2$.

3.2.1 Sketch the graphs of f and h on the same set of axes, clearly showing all intercepts with the axes and asymptotes where applicable. (8)

3.2.2 Write down the domain of f. (2)

[22]

TOTAL: 50

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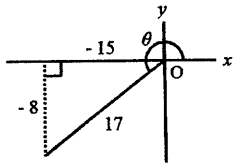
QUESTION 1

1.1.1	$-26\,;\,-29$	✓✓	answer	(2)
1.1.2	$a = 7$ $b = -53$ $c = -161$	✓ ✓ ✓	answer answer answer	(3)
1.1.3	$T_n = -3n - 11$	✓ ✓	$-3n$ -11	(2)
1.2.1	$1\,;\,4\,;\,9\,;\,....$ Answer only: 2/2 $Pattern\ 10 = 10^2 = 100$	✓ ✓	Square pattern 100	(2)
1.2.2	$4\,;\,8\,;\,12\,;\,...$ $T_n = 4n$ Answer only: 3/3 $\therefore T_{24} = 4(24) = 96$	✓ ✓ ✓	Pattern $4n$ 96	(3)
				[12]

QUESTION 2

2.1	$\cot\hat{A} - \sec\hat{B}$ $= \cot 19° - \sec 40°$ $= \frac{1}{\tan 19°} - \frac{1}{\cos 40°}$ $= 1{,}60$	✓ ✓	simplification / convert from reciprocal. answer	(2)
2.2.1	$\sin\theta = -\frac{8}{17}$ $x = \sqrt{(17)^2 - (8)^2} = 15$ $x = -15$  $\cos^2\theta = \left(\frac{-15}{17}\right)^2$ $\cos^2\theta = \frac{225}{289}$	✓ ✓ ✓ ✓	$x = -15$ diagram substitution answer	(4)

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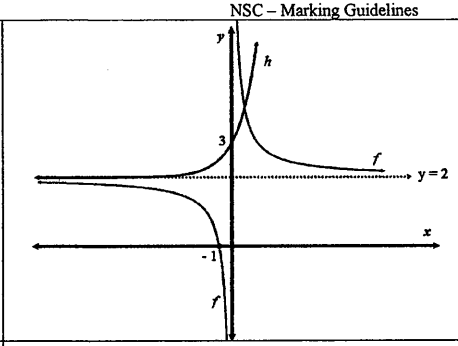
2.2.2	$2\tan\theta - \cos ec\theta$ $= 2\left(\frac{-8}{-15}\right) - \left(\frac{17}{-8}\right)$ $= 2\left(\frac{8}{15}\right) + \left(\frac{17}{8}\right)$ $= \frac{383}{120}$	✓ $\frac{17}{-8}$ ✓ $\frac{-8}{-15}$ ✓ answer	(3)
2.3	$3\cos(3x + 10°) - 1 = 0$ $\cos(3x + 10°) = \frac{1}{3}$ $3x + 10° = 70{,}5287\ldots$ $3x = 60{,}5287\ldots$ $x = 20{,}18°$	✓ simplification ✓ 70,5287…. ✓ 60,5287… ✓ answer	(4)
2.4	$\sin 90° + \tan^2 45° + \sqrt{2}\cos 45°$ $= 1 + (1)^2 + \sqrt{2} \times \frac{1}{\sqrt{2}}$ $= 1 + 1 + 1$ $= 3$ Answer only: 0/3	✓ $\tan^2 45 = 1$ ✓ $\cos 45° = \frac{1}{\sqrt{2}}$ ✓ answer	(3)
			[16]

QUESTION 3

3.1.1	$\frac{1}{2}x^2 - 8 = 0$ $\frac{1}{2}(x-4)(x+4) = 0$ $\therefore x = 4 \text{ or } x = -4$ $A\ (-4;0)$ $B\ (4;0)$ $C\ (0;-4)$ $D\ (0;-8)$	✓✓ $A\ (-4;0)$ ✓✓ $B\ (4;0)$ ✓✓ $C\ (0;-4)$ ✓✓ $D\ (0;-8)$	(8)
3.1.2	$CD = 4\ units$	✓✓ answer	(2)
3.1.3	$k(x) = -\left[\frac{1}{2}x^2 - 8\right]$ $k(x) = -\frac{1}{2}x^2 + 8$	✓ $-\frac{1}{2}x^2$ ✓ $+8$	(2)

3.2.1		f: ✓ x intercept ✓ asymptote ✓ orientation ✓ shape h: ✓ y intercept ✓ asymptote ✓ orientation ✓ shape	(8)
3.2.2	$x \in R\ ;\ x \neq 0$ *or* $x \in (-\infty;0) \cup (0;\infty)$	✓ $x \in R$ ✓ $x \neq 0$ ✓ answer (values) ✓ notation	(2)
			[22]

TOTAL: 50

