

Name: _____

IB placement test in Mathematics

after grade 6

Non-GDC part, 50 minutes

1.)	2.)	3.)	4.)	5.)	6.)	7.)	8.)
2 marks	2 marks	4 marks	4 marks	3 marks	3 marks	3 marks	3 marks
_____ marks out of 24 marks							

GDC part, 50 minutes

1.)	2.)	3.)	4.)	5.)	6.)
3 marks	3 marks	3 marks	5 marks	5 marks	5 marks
_____ marks out of 24 marks					

_____ marks out of 48 marks

Grade: _____

Notenschlüssel:

Sehr gut: 48P – 45P; Gut: 44P – 40P; Befriedigend: 39P – 30P; Genügend: 29P – 24P; Nicht genügend: 23P – 0P

Number of added sheets:

Instructions: Simplify all answers as much as possible and use appropriate notation.

- 1.) The equation $kx^2 + 3x + 1 = 0$ has exactly one solution. Find the value of k . / 2

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- 2.) Solve this equation: $4^{2x} = 32^{(1-x)}$ / 2

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- 3.) Consider the functions $f(x) = 5x$ and $g(x) = \frac{1}{2x-1}$, $x \in \mathbb{R}$, $x \neq \frac{1}{2}$.

(a) Calculate $(f \circ g)(3)$. / 1

(b) Find $g^{-1}(x)$, simplify your answer. / 1

(c) Write down the domain and the range of g^{-1} . / 2

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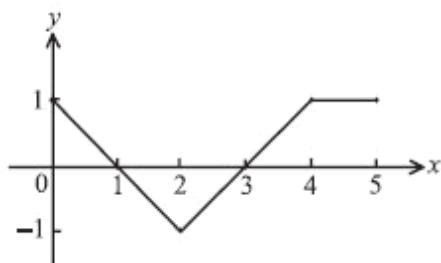
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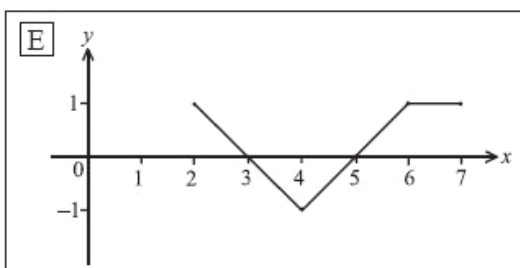
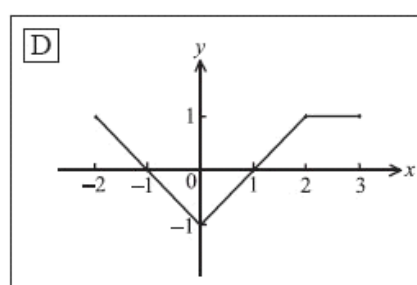
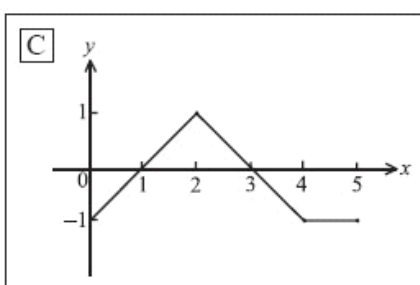
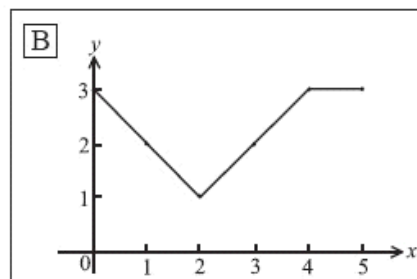
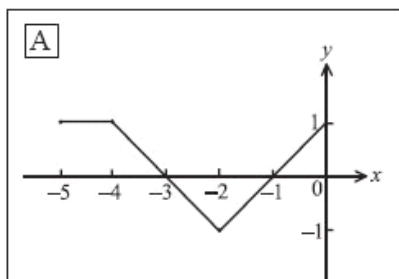
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4.) The following diagram shows part of the graph of $f(x)$.

/ 4



Consider the five graphs in the diagrams labelled A, B, C, D, E.



(a) Which diagram is the graph of $f(x + 2)$?

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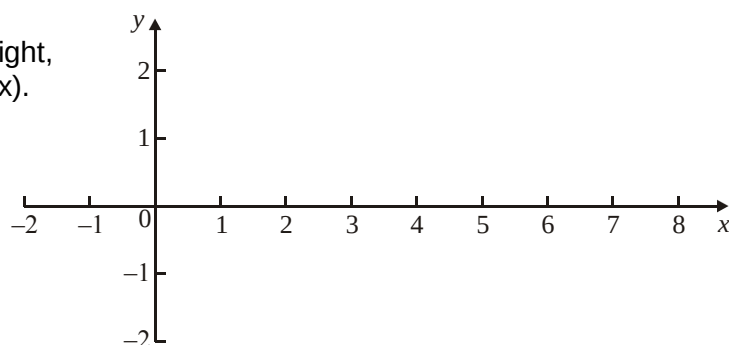
(b) Which diagram is the graph of $-f(x)$?

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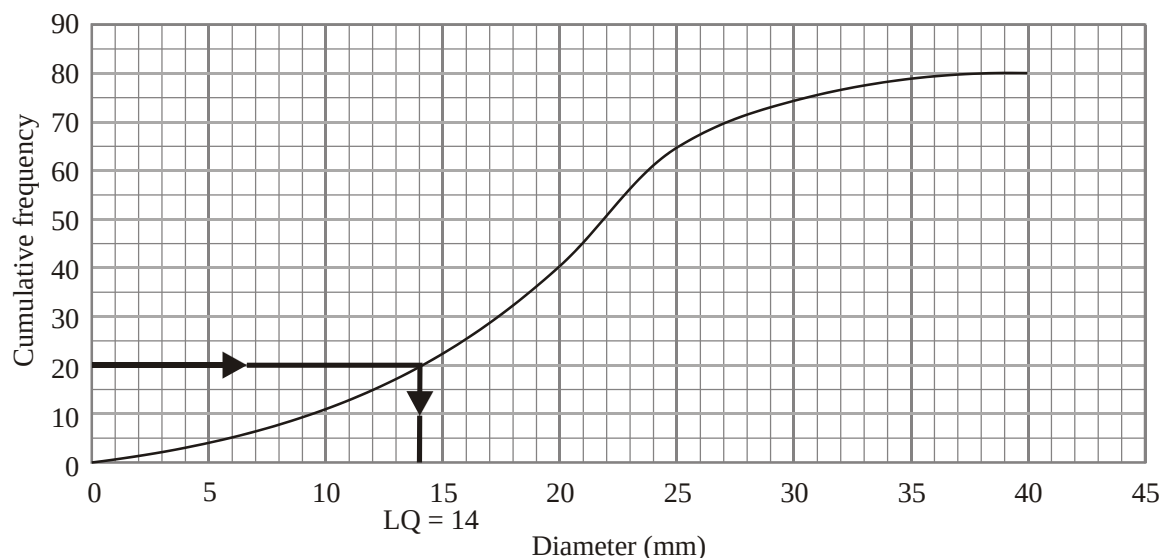
(c) Which diagram is the graph of $f(-x)$?

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(d) On the diagram to the right, sketch the graph of $2 \cdot f(x)$.



- 5.) A student measured the diameters of 80 snail shells. His results are shown in the following cumulative frequency graph. The lower quartile (LQ) is 14 mm and is marked clearly on the graph.



- (a) On the graph, mark clearly in the same way and write down the value of / 2
 (i) the median; (ii) the upper quartile.
 (b) Write down the interquartile range. / 1

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- 6.) Use a Venn diagram to solve this problem:
 In a class of 50 students, 31 play ice hockey, 12 play football and 5 play both of these sports. If one of the students is randomly chosen from the class, determine the probability that this student plays

- (a) ice hockey or football / 1
 (b) ice hockey but not football, / 1
 (c) neither ice hockey nor football. / 1

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7.) Let A and B be points such that $\overrightarrow{OA} = \begin{pmatrix} 5 \\ 2 \\ 1 \end{pmatrix}$, $\overrightarrow{OB} = \begin{pmatrix} 6 \\ 0 \\ 3 \end{pmatrix}$ and $\overrightarrow{AB} = \begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix}$.

Let C and D be points such that ABCD is a **rectangle**.

(a) Given that $\overrightarrow{AD} = \begin{pmatrix} 4 \\ p \\ 1 \end{pmatrix}$, show that $p = 3$. / 1

(b) Find the coordinates of point C. / 1

(c) Find the area of rectangle ABCD. / 1

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8.) (a) Let $\log_c 3 = p$ and $\log_c 5 = q$. Find an expression in terms of p and q for / 2

(i) $\log_c 15$;

(ii) $\log_c 25$.

(b) Find the value of d if $\log_d 6 = \frac{1}{2}$. / 1

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Name:

Number of added sheets:

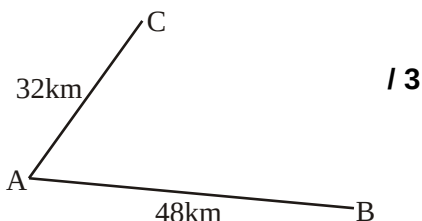
IB placement test after grade 6

(GDC part, 50 minutes)

Instructions: All numerical answers must be given exactly or correct to three significant figures.
All necessary work must be shown. Use appropriate notation.

- 1.) Town A is 48 km from town B and 32 km from town C as shown in the diagram.

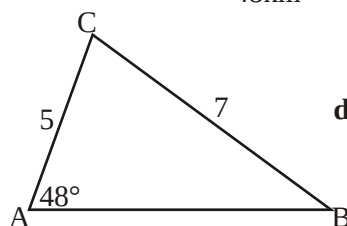
Given that town B is 56 km from town C,
find the size of angle $\hat{CAB}$ to the nearest degree.



/ 3

- 2.) In triangle ABC, $AC = 5$, $BC = 7$, $\hat{A} = 48^\circ$,
as shown in the diagram.

Find $\hat{B}$,
giving your answer correct to the nearest degree.



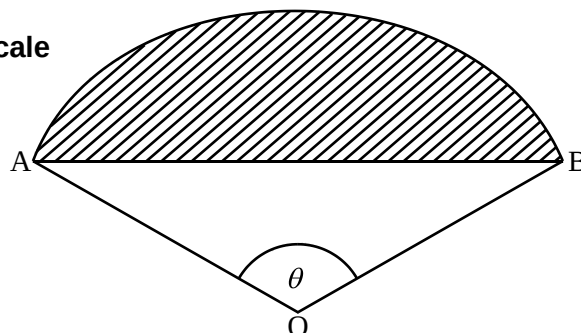
/ 3
diagram not to scale

- 3.) The diagram below shows a sector AOB of a circle of radius 15 cm and centre O. The angle θ at the centre of the circle is 2 radians.

/ 3

Diagram not to scale

- (a) Calculate the area of the sector AOB.
(b) Calculate the area of the shaded region.



- 4.) The quadratic function f is defined by $f(x) = 3x^2 - 12x + 5$.
It can be written in the form $f(x) = 3(x - 2)^2 - 7$.

- (a) Write down the coordinates of the vertex and the y-intercept of the function $f(x)$. / 2
(b) Calculate the roots of the function $f(x)$ correct to 3 significant figures. / 1
(c) The graph of $f(x)$ is translated 3 units in the positive x-direction and 5 units in the positive y-direction to give the function g . Find the coordinates of the vertex of g . / 2

Find the function $g(x)$ for the translated graph, giving your answer in the form $g(x) = 3(x-p)^2 + q$.

- 5.) Consider the straight lines g and h in space:

$$g: \overrightarrow{OX} = \begin{pmatrix} 9 \\ 4 \\ -1 \end{pmatrix} + t \cdot \begin{pmatrix} 4 \\ 1 \\ -2 \end{pmatrix} \qquad h: \overrightarrow{OX} = \begin{pmatrix} -11 \\ 7 \\ -5 \end{pmatrix} + s \cdot \begin{pmatrix} 8 \\ -2 \\ 3 \end{pmatrix}$$

- (a) Find the point of intersection Q of the line g and the line h . / 3
(b) Find the angle between the lines g and h . / 2

6.) Klara is a student at IB World College. The probability that she will be woken by her alarm clock is $\frac{2}{9}$.

If she is woken by her alarm clock the probability she will be late for school is $\frac{1}{5}$.

If she is not woken by her alarm clock the probability she will be late for school is $\frac{2}{3}$.

Let W be the event “Klara is woken by her alarm clock”.

Let L be the event “Klara is late for school”.

(a) Complete the tree diagram.

/ 1

(b) Calculate the probability that Klara will be late for school.

/ 2

(c) Given that Klara is late for school what is the probability that she was woken by her alarm clock?

/ 2

