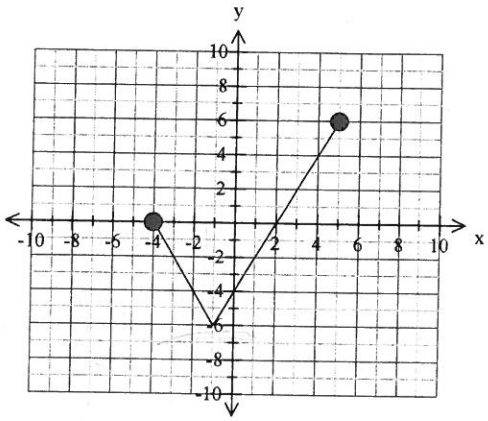
Answer key

Math 4

Name: _____

VARIATION: Increasing/Decreasing

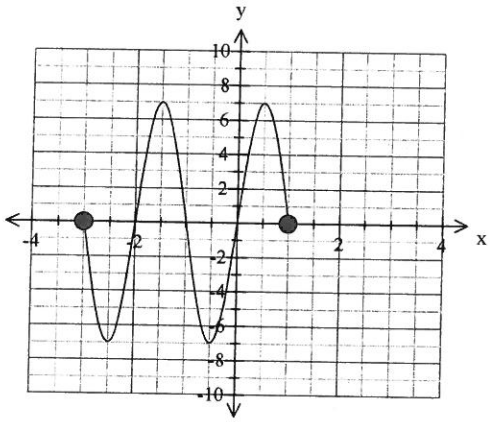
Determine the Domain and the intervals of VARIATION for each function:



Domain: [-4, 5]

Increasing: [-1, 5]

Decreasing: [-4, -1]



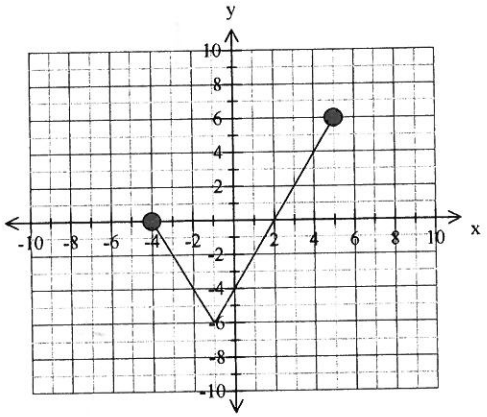
Domain: [-3, 1]

Increasing: [-2.5, -1.5] ∪ [-0.5, 0.5]

Decreasing: [-3, -2.5] ∪ [-1.5, -0.5] ∪ [0.5, 1]

Signs: Positive/Negative

Determine Domain, Zeros and the SIGNS for each function:

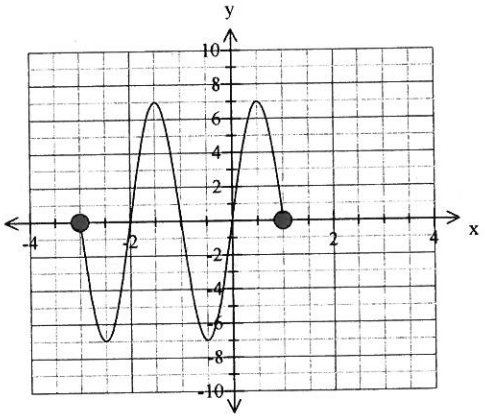


Domain: [-4, 5]

Zeros: -4, 2

Positive: [2, 5]

Negative: [-4, 2]



Domain: [-3, 1]

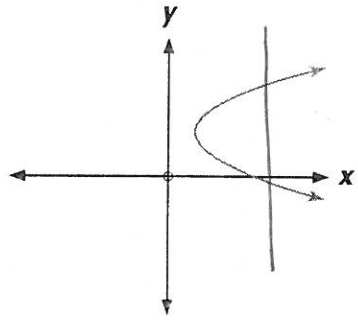
Zeros: -3, -2, -1, 0, 1

Positive: [-2, -1] ∪ [0, 1]

Negative: [-3, -2] ∪ [-1, 0]

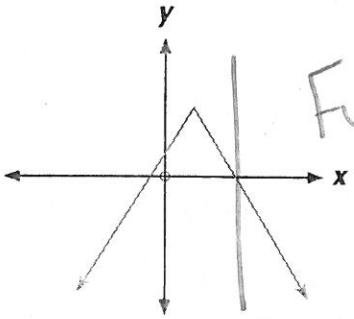
5. State whether the following represent functions or relations

a.



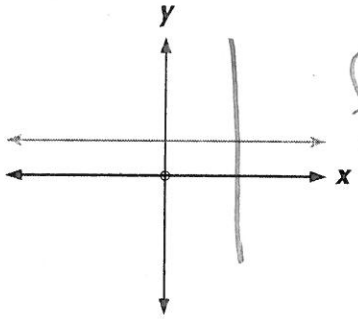
relation

c.



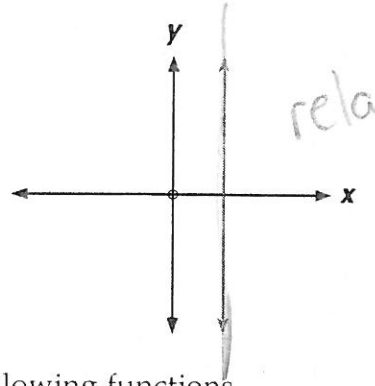
Function

b.



function

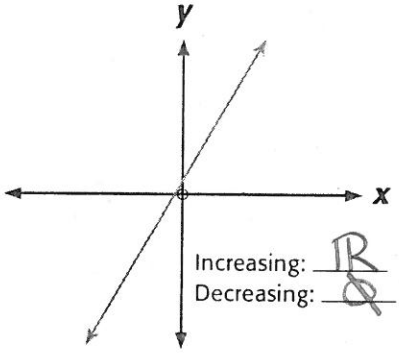
d.



relation

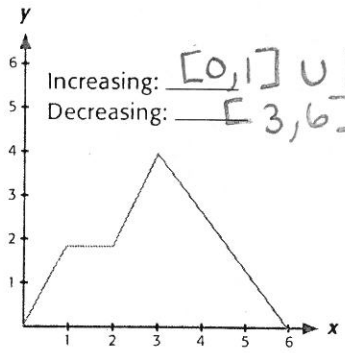
6. State the increasing and decreasing intervals of the following functions.

a.



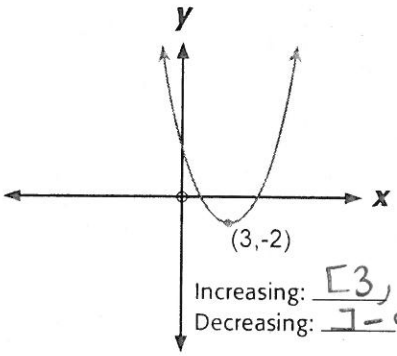
Increasing: $\mathbb{R}$
Decreasing: $\emptyset$

c.



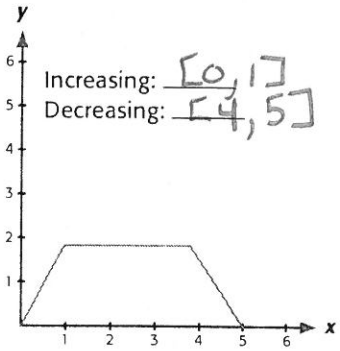
Increasing: $[0,1] \cup [2,3]$
Decreasing: $[3,6]$

b.



Increasing: $[3, \infty[$
Decreasing: $]-\infty, 3]$

d.



Increasing: $[0,1]$
Decreasing: $[4,5]$

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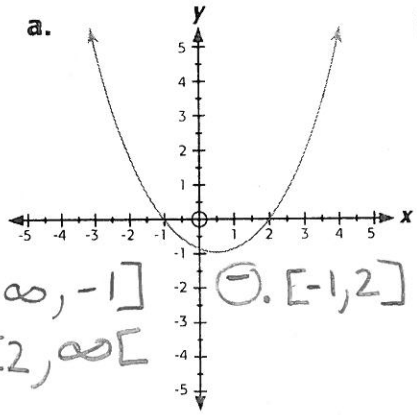
8. State the sign of the following functions.

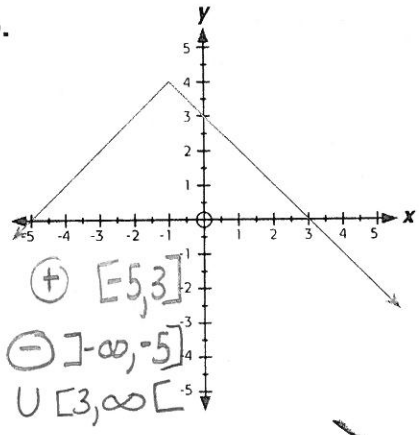
a.



⊕.]-∞, -1] ∪ [2, ∞[

⊖. [-1, 2]

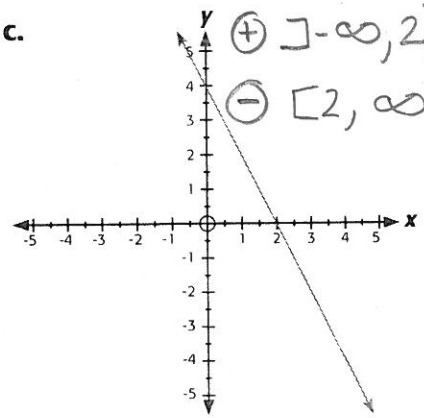
b.



⊕ [-5, 3]

⊖]-∞, -5] ∪ [3, ∞[

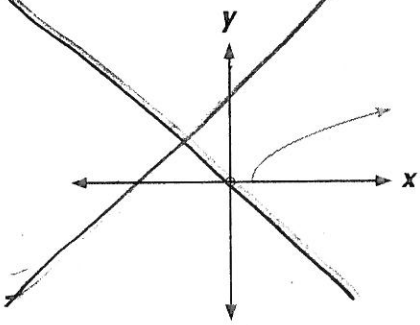
c.



⊕]-∞, 2]

⊖ [2, ∞[

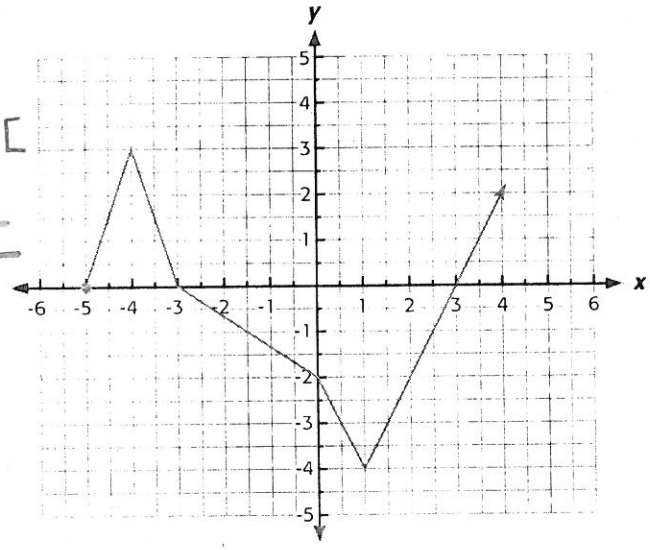
9. **a.** Draw $f^{-1}(x)$ given:



b. Determine the rule of $g^{-1}(x)$ given $g(x) = 3x + 4$.

10. State all of the properties for the following function

Domain	[-5, ∞[
Range	[-4, ∞[
Increasing	[-5, -4] ∪ [1, ∞[
Decreasing	[-4, 1]
Positive	[-5, -3] ∪ [3, ∞[
Negative	[-3, 3]
Absolute Max	∅
Absolute Min	-4
Relative Max	3
Relative Min	∅
Y Intercept	-2
Zero(s)	-5, -3, 3



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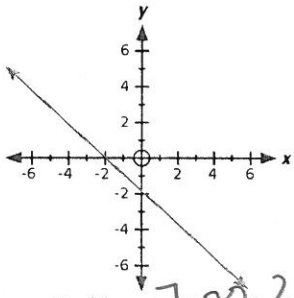
7. State the positive and negative intervals of the following functions.

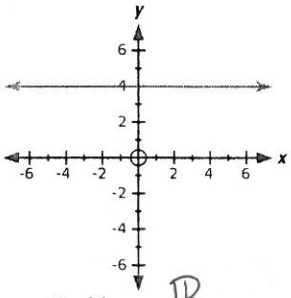
a.



Positive: $]-\infty, 2]$

Negative: $[-2, \infty[$

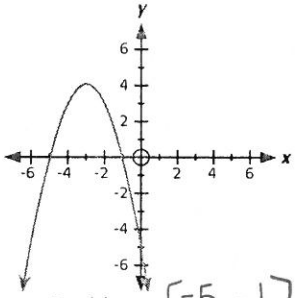
c.



Positive: $\mathbb{R}$

Negative: $\emptyset$

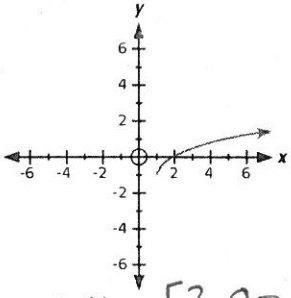
b.



Positive: $[-5, -1]$

Negative: $]-\infty, -5] \cup [-1, \infty[$

d.

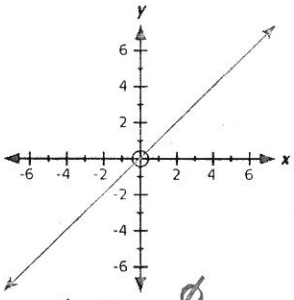


Positive: $[2, \infty[$

Negative: $[1, 2]$

8. State the absolute extremes of the following functions.

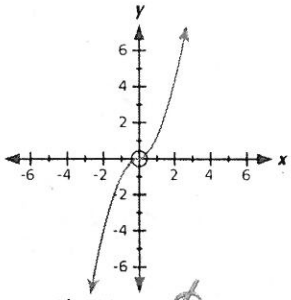
a.



Abs Max: $\emptyset$

Abs Min: $\emptyset$

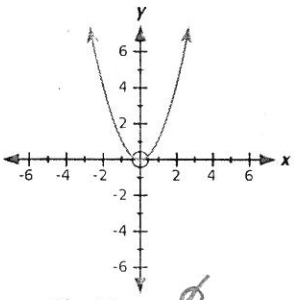
c.



Abs Max: $\emptyset$

Abs Min: $\emptyset$

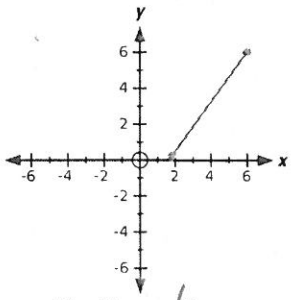
b.



Abs Max: $\emptyset$

Abs Min: 0

d.

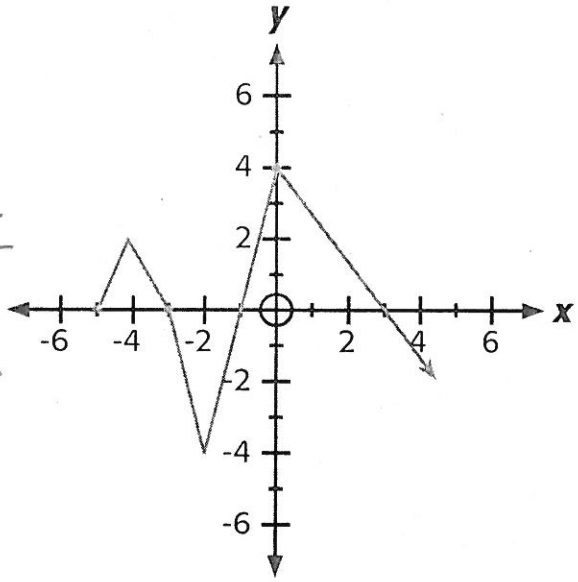


Abs Max: 6

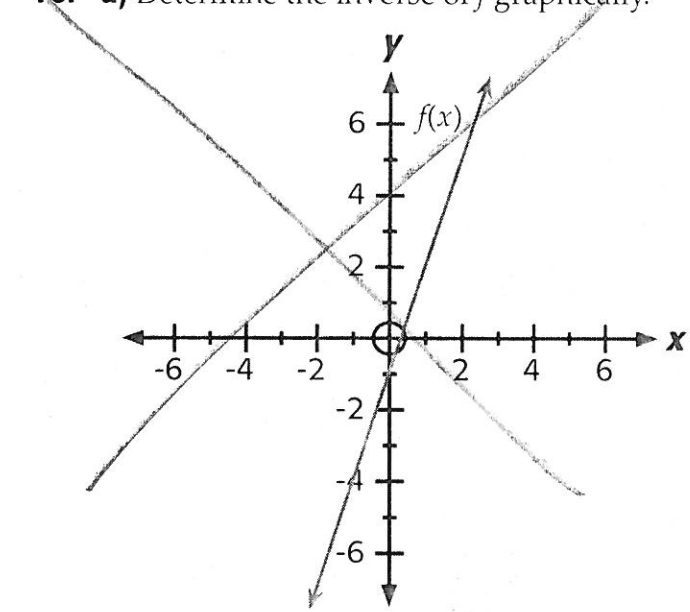
Abs Min: 0

9. State all of the properties for the following function

Domain	$[-5, \infty[$
Range	$]-\infty, 4]$
Increasing	$[-5,-4] \cup [-2,0]$
Decreasing	$[-4,-2] \cup [0, \infty[$
Positive	$[-5,-3] \cup [-1,3]$
Negative	$[-3,-1] \cup [3, \infty[$
Absolute Max	4
Absolute Min	$\emptyset$
Relative Max	2
Relative Min	-4
Y Intercept	4
Zero(s)	$-5, -3, -1, 3$



10. **a)** Determine the inverse of f graphically.



b) Determine the rule of the inverse algebraically.

$g(x) = 7x - 3$

$g^{-1}(x) =$ _____

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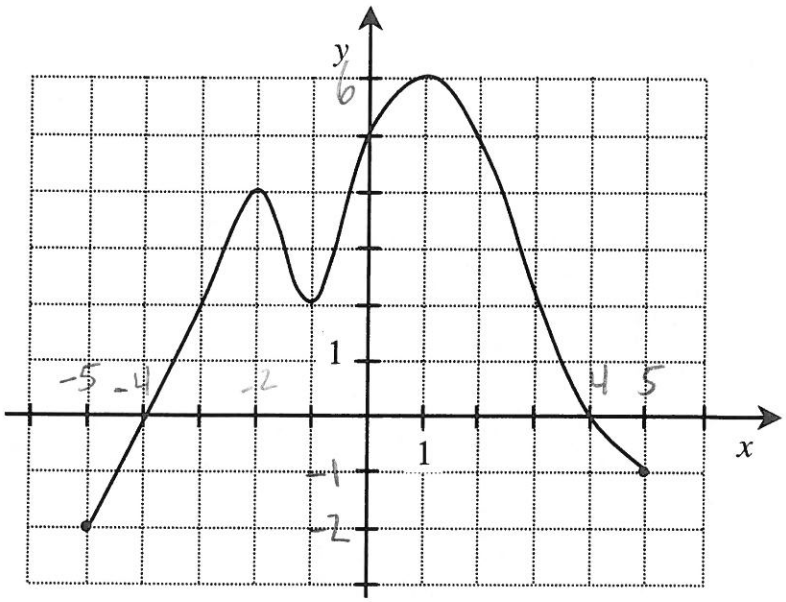
Consider the graph of function *f* in the Cartesian plane below. State the properties of this function



a. Domain:
[-5, 5]

b. Range:
[-2, 6]

c. Y-intercept:
5

d. Zero(s):
-4, 4

e. Increasing:
[-5, -2] U [-1, 1]

f. Decreasing:
[-2, -1] U [1, 5]

g. Positive:
[-4, 4]

h. Negative:
[-5, -4] U [4, 5]

i. Absolute Maximum:
6

j. Absolute Minimum:
-2

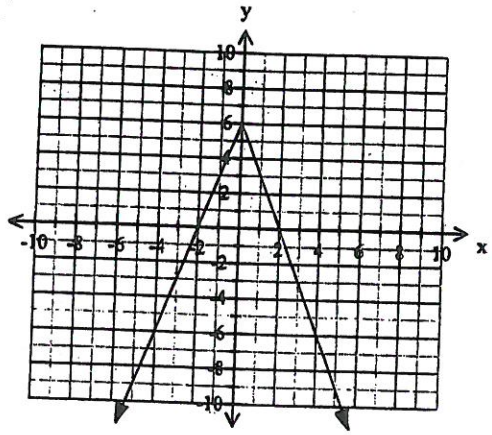
Name: _____

Properties of Functions

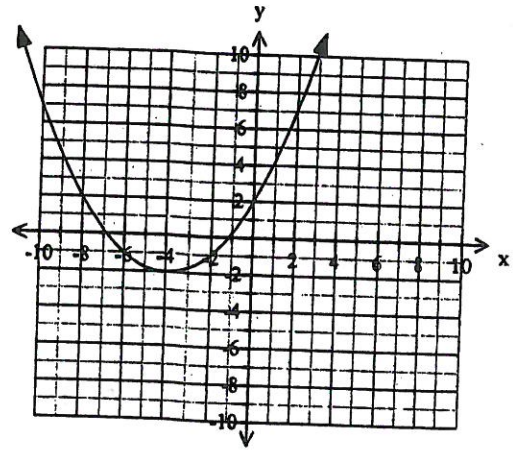
Math 4 CST

1.

(a)



(b)



For each of the above functions specify:

	(a)	(b)
Domain:	$\mathbb{R}$	$\mathbb{R}$
Range:	$]-\infty, 6]$	$[-2, \infty[$
Increasing:	$]-\infty, 0]$	$[-4, \infty[$
Decreasing:	$[0, \infty[$	$]-\infty, -4]$
Max:	6	$\emptyset$
Min:	$\emptyset$	-2
y-intercept:	$-2, 2$	2
zero(s):	$[-2, 2]$	$-7, -1$
Positive:	$[-2, 2]$	$]-\infty, -7] \cup [-1, \infty[$
Negative:	$]-\infty, -2] \cup [2, \infty[$	$[-7, -1]$

Name: _____

Group: _____ Date: _____

CONSOLIDATION 2.2

Properties of Functions

1 The following graph provides data on the drive Diane took last Sunday.

a) What is the:

1) domain? [0, 60]

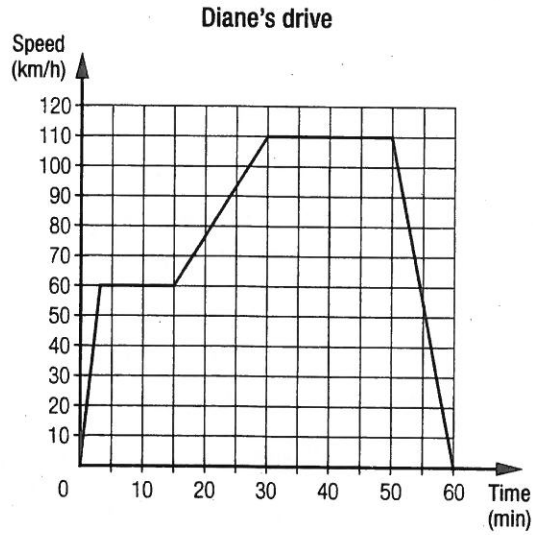
2) range? [0, 110]

b) Over what intervals can we see the curve:

1) increasing?
[0, 4] ∪ [15, 30]

2) decreasing?
[50, 60]

c) What maximum speed did Diane's car reach?
110 km/h



d) For how long did the car maintain this maximum speed? 20 mins

e) For how long did her Sunday drive last? 60 mins

2 Julie belongs to an athletics club. The graph below provides data on her heart rate during indoor training. Taking the context into account, determine the properties of this function.

a) Domain: [0, 20]

b) Range: [70, 190]

c) Increase: [0, 3] ∪ [5, 7] ∪ [10, 16]

d) Decrease: [3, 5] ∪ [7, 10] ∪ [16, 20]

e) Positive sign: [0, 20]

f) Negative sign: ∅

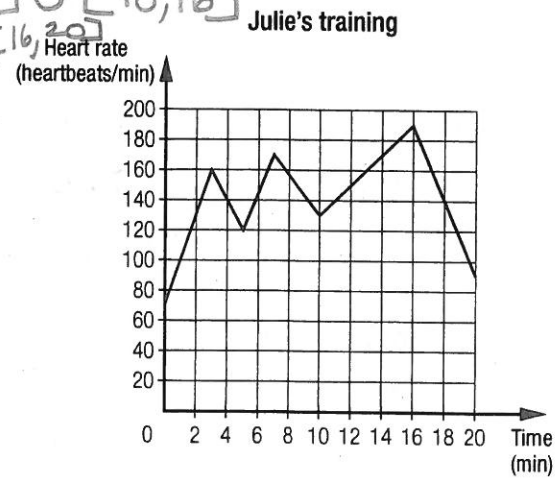
g) Sign that is both positive and negative:
∅

h) Initial value: 70

i) Zero of the function: ∅

j) Maximum: 190

k) Minimum: 70



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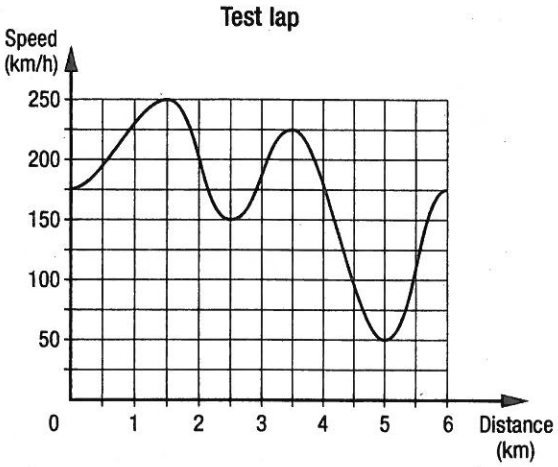
3 The graph on the right shows the changing speed of a race-car driver as a function of the distance travelled in one test lap.



a) What is the:

1) domain? [0, 6]

2) range? [50, 250]

b) What is the initial value and what does it represent in this context?

175 km/h, the speed of the car at the start of the test

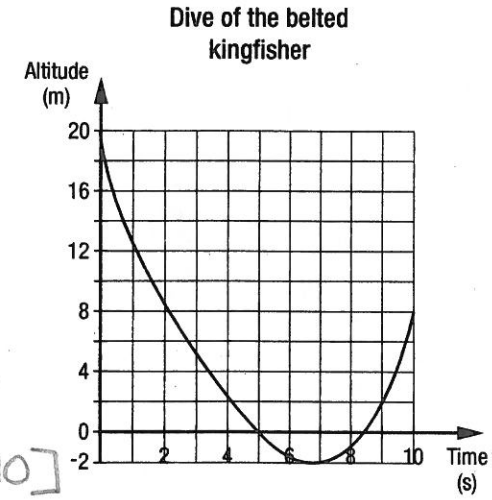
c) What was the speed of the car at the end of the test? 175 km/h

d) What was the maximum speed reached by the car? 250 km/h

e) How many big curves does the course have?

1 big curve

4 The graph on the right provides data on the flying and hunting activities of the belted kingfisher. This bird feeds on beetles, grasshoppers and small fish. Taking the context into account, make a complete analysis of this function.



a) Domain: [0, 10]

b) Range: [-2, 20]

c) Increase: [7, 10]

d) Decrease: [0, 7]

e) Positive signs: [0, 5] ∪ [8.5, 10]

f) Negative sign: [5, 8.5]

g) Signs that are both positive and negative:

_____

h) Initial value: 20

i) Zeros of the function: 5, 8, 5

j) Maximum: 20

k) Minimum: -2

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