T&T3 18.1.pptx

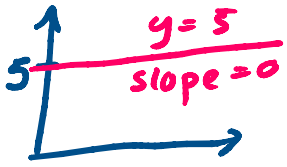
19 November 2019 12:06

$y = 4x^1$ Slope = 4

$dy/dx = 4x^{1-1} = 4x^0 = 4(1) = 4$

$y = mx + c$

$y = -3x^1 + 5$ Slope = -3

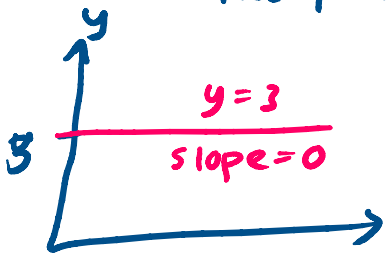


$dy/dx = -3x^{1-1} = -3x^0 \Rightarrow -3(1) = -3$

$y = 7x^4 + 3x^3 + 5x^2 - 9x + 3$

$dy/dx = 28x^3 + 9x^2 + 10x - 9$

Multiply the power by coefficient then subtract 1 from the power.



$y = \frac{2}{3}x^1$

↓

Slope.

$dy/dx = \frac{2}{3}$

T&T3 18.1

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PROJECT MATHS

Text & Tests

Leaving 3 Certificate

Chapter 18

Calculus

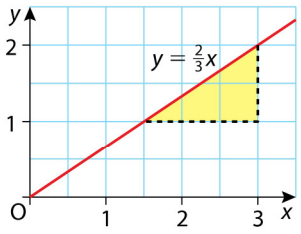
Section 18.1 The slope of a line

Exercise 18.1

1. Use the given grid to write down the rate of change of y with respect to x.

Give another name for this rate of change.

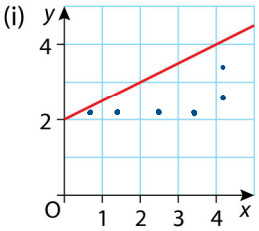
Now write down the value of $\frac{dy}{dx}$.



Exercise 18.1

2. Write down the rate of change of y with respect to x $\left(\frac{dy}{dx}\right)$ in each of these grids:

(i)

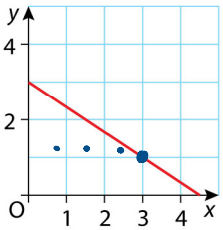


Rise / Run = 2/4 = 1/2

Slope = 1/2

dy/dx = 1/2

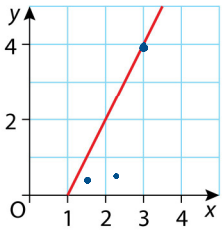
(ii)



Rise / Run = −2/3

Slope = −2/3 = dy/dx

(iii)



Rise / Run = 4/2 = 2

Slope = 2 dy/dx.

Exercise 18.1

3. Write down $\frac{dy}{dx}$ for each of these linear functions:

(i) $y = 3x$ (ii) $y = 2x - 1$ (iii) $y = 4x + 3$ (iv) $y = 5x + 6$

(v) $y = -2x$ (vi) $y = -3x + 7$ (vii) $y = 7x - \frac{1}{2}$ (viii) $y = 2$

i) $dy/dx = 3x^{1-1}$

$3x^0$

$3(1)$

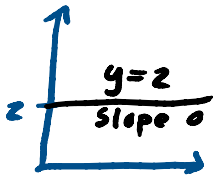
$= 3$

$dy/dx = 2x^{1-1}$

$2x^0$

$2(1)$

$= 2$



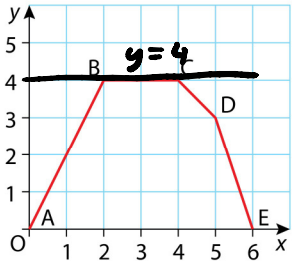
Exercise 18.1

4. Find the rate of change of y with respect to x $\left(\frac{dy}{dx}\right)$ for the line joining

(i) A and B $\frac{4}{2} = 2$ (ii) B and C slope = 0

(iii) C and D -1 (iv) D and E. -3

Explain why $\frac{dy}{dx}$ is negative for the line joining D and E.



Exercise 18.1

5. $y = 3x - 2$ is a linear function.

By completing the table of outputs on the right, write down the difference between the outputs.

Now write down the value of $\frac{dy}{dx}$.

What is the connection between the difference of the outputs and $\frac{dy}{dx}$?

x	y
0	−2
1	1
2	4
3	7

$y = 3(1) - 2 = 1$

$y = 3(2) - 2 = 4$

$y = 3(3) - 2 = 7$

$dy/dx = 3x^1$

$3x^{1-1}$

$3x^0$

$3(1) = 3$

Exercise 18.1

6. Make up a function of your own for the following rates of change. (The first one is done for you.)

$\frac{dy}{dx}$	Function
$\frac{dy}{dx} = 10$	$y = 10x$
$\frac{dy}{dx} = 6$	
$\frac{dy}{dx} = -4$	
$\frac{dy}{dx} = \frac{1}{2}$	
$\frac{dy}{dx} = 0$	

$y = 5x^2 = 10x$

$y = 6x + 7$

$y = -4x + 21$

$y = \frac{1}{2}x + 120$

$y = 69$ $y = 125$

Exercise 18.1

7. Copy and complete the table below by writing a function to suit the given information. (The first one is done for you.)

y-intercept	$\frac{dy}{dx}$ Slope	Function
3	2	$y = 2x + 3$
-2	4	$y = 4x - 2$
-3	2	$y = 2x - 3$
0	4	$y = 4x$
2	$\frac{1}{2}$	$y = \frac{1}{2}x + 2$
0	$\frac{2}{3}$	$y = \frac{2}{3}x$

$y = mx + c$

Exercise 18.1

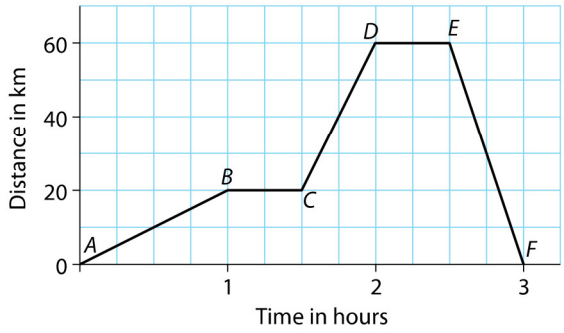
8. (i) An aunt decides to give her niece €50 pocket money on the 1st January and she increases it by €10 per year from then on.
What is the rate of change of pocket money with respect to time (years)?

(ii) A train travels at a steady speed of 80 km/hr.
What is the rate of change of distance (km) with respect to time (hours)?

(iii) A sunflower is 5 cm in height when bought and grows 3 cm per week thereafter.
What is the rate of change of height (cm) in relation to time (weeks)?

Exercise 18.1

9. The distance–time graph shows the journey of a motorcyclist who set out from town *A*.



(i) What is the rate of change of distance in relation to time for the journey from *A* to *B*?
(ii) What is the average speed from *A* to *B*?
(iii) What is the slope of the line *BC*?
(iv) What is the average speed between *B* and *C*?
(v) What is the average speed between *C* and *D*?
(vi) What is the rate of change of distance in relation to time for the journey from *E* to *F*? Suggest another way of asking this question.

Answers 18.1

1. $\frac{2}{3}$; slope; $\frac{2}{3}$

2. (i) $\frac{1}{2}$ (ii) $-\frac{2}{3}$ (iii) 2

3. (i) 3 (ii) 2 (iii) 4 (iv) 5
(v) -2 (vi) -3 (vii) 7 (viii) 0

4. (i) 2 (ii) 0 (iii) -1
(iv) -3; as the line is falling (from left to right)

5. 3; 3; same

8. (i) €10/year (ii) 80 km/hr
(iii) 3 cm/week

9. (i) 20 km/hr (ii) 20 km/hr
(iii) 0 (iv) 0 km/h
(v) 80 km/hr (vi) 120 km/hr