“SIMPLE DERIVATIVES” or “FINDING GRADIENTS OF CURVES” or “ DIFFERENTIATING”.

GENERAL RULE

If $y = x^n$

then $y' = n\,x^{n-1}$

MODEL EXAMPLES:

This rule works for ALL numerical values of n.

eg. 1. $y = x^8$

$y' = 8x^7$

2. $y = x^{-9}$

$y' = -9\,x^{-10}$

3. $y = x^{6.4}$

$y' = 6.4\,x^{5.4}$

4. $y = x^{7/8}$

$y' = \frac{7}{8}\,x^{-1/8}$

5. $y = 5x^2$

$y' = 10x^1 = 10x$

6. $y = 4x = 4\,x^1$

$y' = 1 \times 4\,x^0 = 4$

but we should not go to this trouble in cases like this. It is better to think of y = 4x as a line of gradient 4. In other words there is no need to use the general rule for x to the power 1.

7. Similarly $y = 6$ is a horizontal line so its gradient is zero. $y' = 0$

Applying the general rule here is possible but not necessary!

eg $y = 6 = 6\,x^0$

So $y' = 0 \times 6 \times x^{-1} = 0$

Find the “gradient functions”
(or “differentiate” these equations)
(or “find the derivatives”)
(or “find the derived functions”)

1. $y = x^5$ $y' =$

2. $y = 4x^7$ $y' =$

3. $y = x^{-4}$ $y' =$

4. $y = x^{1.6}$ $y' =$

5. $y = x^{2/3}$ $y' =$

6. $y = 12\,x^2$ $y' =$

7. $y = 8x$ $y' =$

8. $y = \frac{x}{3}$ $y' =$

9. $y = 2$ $y' =$

10. $y = x^3 + 5\,x^2 + 7x + 4$

$y' =$

11. $y = (x+5)^2 = (x+5)(x+5)$

$=$

$y' =$

12. $y = (3x+4)(2x-5)$

$=$

$y' =$

13. $y = \frac{x^{12} + x^7}{x^3} = \frac{x^{12}}{x^3} + \frac{x^7}{x^3}$

$= x^9 + x^4$

$y' =$

14. $y = \frac{x^9 + x^5}{x^3}$

$y' =$

15*. $y = \frac{6x^8 + 4x^{12}}{2x^5}$

$y' =$

16* $y = \sqrt{x} = x^{1/2}$

$y' =$

17. $y = 4(3-2x)$

$y' =$

18. $y = x(4x-5)$

$y' =$

19. $y = \frac{4x^5}{3}$

$y' =$

20. $y = 8 - 0.5x + \frac{3x^4}{5}$

$y' =$

21. $y = \pi(x+3)^2$

$=$

$y' =$