

[Q1 to Q15]

1. Calculate the gradient of $y = 24 + 5x - x^2$ at x =-1.5 [3]
   0580/43/O/N/20 Q7 (a)(iii)

2. (a) Differentiate $6 + 4x - x^2$ [2]
   (b) Find the coordinates of the turning point of the graph of $y = 6 + 4x - x^2$ [2]
   0580/22/O/N/20 Q21

3. (i) Differentiate $x^2 + 3x - 4$ **[2]**
   (ii) Find the equation of the tangent to the curve at the point (2, 6). [3]
   0580/41/O/N/20 Q10 (a)

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4. Find the equation of the tangent to the graph of $y = x^3 - 4x^2 + 4x$ at $x = 4$.
   Give your answer in the form $y = mx + c$. [7]
   0580/42/M/J/21 Q9)(b)

5. Find the equation of the tangent to the graph of $y = 18 - 3x - x^2$ at $x = 4$.
   Give your answer in the form $y = mx + c$. [6]
   0580/41/O/N/21 Q8b(iii)

6. Find the x-coordinates of the points on the graph of $y = x^5 - 5x^4$ where the gradient is 0. [4]
   0580/23/M/J/21 Q25

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7. (a) $y = 3x^2 - 12x + 7$

   (i) Find the value of $\frac{dy}{dx}$ when $x = 5$.

   (ii) Find the coordinates of the point on the graph of $y = 3x^2 - 12x + 7$ where the gradient is 0

   (b) When $y = 2x^p + qx^2$, $\frac{dy}{dx} = 14x^6 + 6x$.

   Find the value of p and the value of q. [2]

   0580/41/M/J/22 Q6)

8. A curve has equation $y = x^3 - 6x^2 + 16$

   (a) Work out the coordinates of the two turning points [6]

   (b) Determine whether each of the turning points is a maximum or a minimum. Give reasons for your answers. [3]

   0580/04/SP/20 Q11

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9. A curve has equation $y = x^3 - 3x + 4$

(a) Work out the coordinates of the two stationary points [5]

(b) Determine whether each stationary point is a maximum or a minimum.
Give reasons for your answers. [3]

0580/42/F/M/20 Q11

10. (a) $y = x^4 - 4x^3$

(i) Find the value of y when x =-1. [2]

(ii) Find the two stationary points on the graph of $y = x^4 - 4x^3$ [6]

(b) $y = x^p + 2x^q$

$\frac{dy}{dx} = 11x^{10} + 10x^4$, where $\frac{dy}{dx}$ is the derived function

Find the value of *p* and the value of *q*. [2]

0580/42/M/J/20 Q10

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11. A curve has equation $y = 4x^3 - 3x + 3$

(i) Find the coordinates of the two stationary points [5]

(ii) Determine whether each of the stationary points is a maximum or a minimum. Give reasons for your answers. [3]

0580/43/M/J/20 Q12)

12. (i) Find the derivative, $\frac{dy}{dx}$, of $y = 5 + 8x - \frac{4}{3}x^3$. [2]

(ii) Find the gradient of $y = 5 + 8x - \frac{4}{3}x^3$ at $x = -1$. [2]

(iii) A tangent is drawn to the graph of $y = 5 + 8x - \frac{4}{3}x^3$.

The gradient of the tangent is -28 .

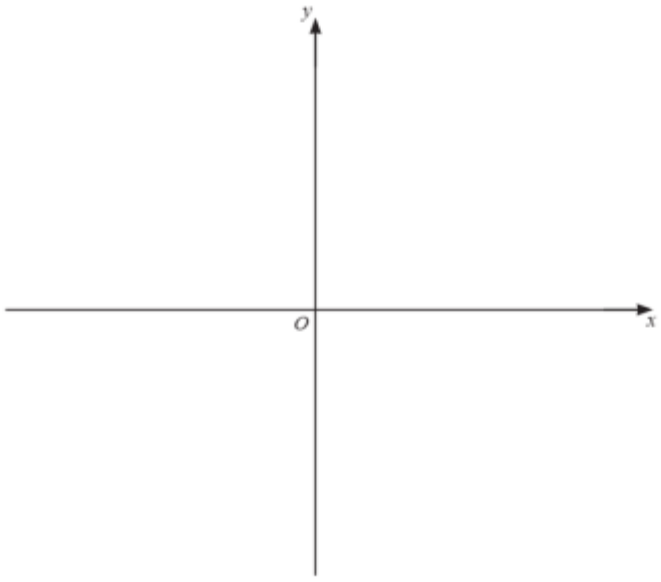
Find the coordinates of the two possible points where this tangent meets the graph. [5]

0580/43/O/N/22 Q9(b)

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13. A curve has equation $y = x^3 + ax + b$.
The stationary points of the curve have coordinates
$(2, k)$ and $(-2, 10 - k)$.
Work out the value of a, the value of b and the value of k. [6]
0580/42/F/M/22 Q12(c)

14. f$(x) = x(x - 1)(x - 2)$
(a) Find the coordinates of the points where the graph of $y = \text{f}(x)$ crosses the x-axis.
(b) Show that f$(x) = x^3 - 3x^2 + 2x$. [2]
(c) Find the coordinates of the turning points of the graph of y = f(x).
Show all your working and give your answers correct to 1 decimal place [8]
(d) Sketch the graph of $y = \text{f}(x)$. [2]



0580/43/O/N/21 Q)9

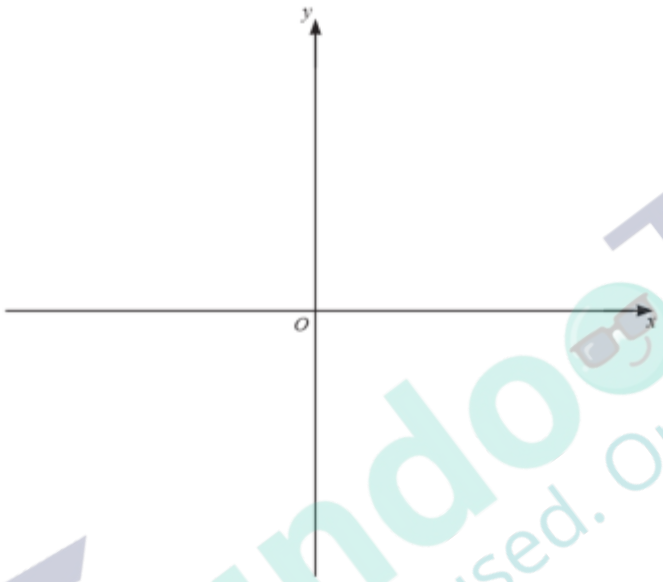
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15. $f(x) = x^3 - 3x^2 - 4$

(a) Find the gradient of the graph of $y = \mathrm{f}(x)$ where $x = 1$. [3]

(b) Find the coordinates of the turning points of the graph of $y = \mathrm{f}(x)$. [4]

(c) Sketch the graph of $y = \mathrm{f}(x)$. [2]



0580/42/F/M/23 Q9)

16. A curve has the equation $y = x^3 + 8x^2 + 5x$

(i) Work out the coordinates of the two turning points [6]

(ii) Determine whether each of the turning points is a maximum or a minimum. Give reasons for your answers. [3]

0580/41/M/J/20 Q10(b)

[Q16 to 18]

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17. A curve has equation $y = x^3 - 2x^2 + 5$.

Find the coordinates of its two stationary points. [5]

0580/22/F/M/21 Q24)

18. A curve has equation $y = 2x^3 - 4x^2 + 6$.

(i) Find $\frac{dy}{dx}$, the derived function of y. [2]

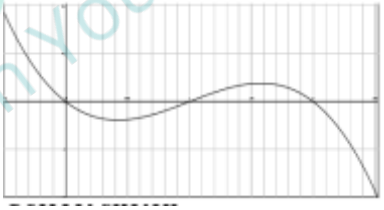
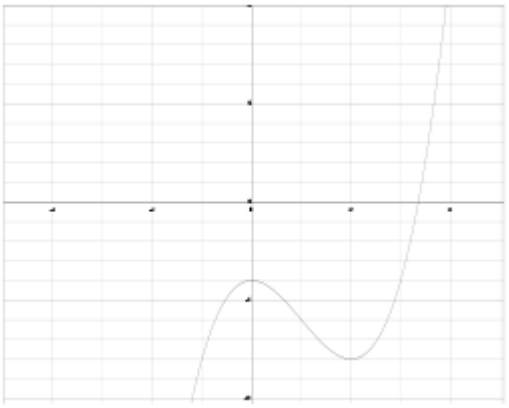
(ii) Calculate the gradient of the curve $y = 2x^3 - 4x^2 + 6$ at $x = 4$. [2]

(iii) Find the coordinates of the two stationary points on the curve. [4]

0580/41/M/J/21 Q7(c)

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Answers

1) 8	10) (a)(i) 5 (ii) (0, 0) and (3, –27) (b) 11 and 5
2) (a) $4-2x$ (b) $(2,10)$	11) (a) (i) (-1/2,4) and (1/2 ,2) (ii) (-1/2,4) max with reason and (1/2 ,2) min with reason
3) (ii) $2x+3$ (iii) $y=7x-8$	12) (i)$8-4x^2$ (ii)4 (iii) $(3,-7)$ and $(-3,17)$
4) $y=20x-64$	13) a = –12, b = 5, k = –11
5) $y=34-11x$	14) (a) $(0,0)$, $(1,0)$, $(2,0)$ (c) $(0.4,0.4)$, $(1.6,-0.4)$ (d) 
6) 0 and 4	15) (a) -3 (b) $(0,-4)$ and $(2,-8)$ (c) 
7) (b)(i)18 (ii)(2,-5) (c) 7 and 3	16) (i) (-1/3,-22/27) , (-5,50) (ii) (-1/3,-22/27) minimum , (-5,50) maximum with correct reasons

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8) (a) (0, 16) (4, –16) (b) (0, 16) maximum with correct reason (4, –16) minimum with correct reason	17) $(0,5)$, $\left(\frac{4}{3}, \frac{103}{27}\right)$
9) (a) (1,2) (-1,6) (b) (1, 2) minimum with reason (−1, 6) maximum with reason [Reasons could be e.g. a reasonable sketch correct use of 2nd derivative = $6x$ = 6 , 6 > 0,so (1, 2) minimum oe 2nd derivative = 6x = –6 , –6 < 0 so (–1, 6) maximum oe, or finds gradient on each side of both correct stationary points with correct conclusion]	18) (i) $6x^2 - 8x$ (ii) 64 (iii) (0,6) and $\left(\frac{4}{3}, \frac{98}{27}\right)$

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