

Core 1 Essential skills 1

Student Name: ANSWERS.	Target:
--	---------

1	Find the midpoint of (12,2) and (-7,-3)	$(\frac{5}{2}, -\frac{1}{2})$
2	Find the gradient of the line between (1,4) and (-7,52)	-6
3	Write down the gradient and y-intercept of $10y - 5x = 7$	$m = \frac{1}{2}$ $c = \frac{7}{10}$
4	Line L_1 has equation $x + 5y + 14 = 0$ Write down the gradient of any line perpendicular to this one.	$m = 5$
5	Find the equation of the line perpendicular to L_1 that passes through (3,-1)	$y = 5x - 16$
6	Find the point of intersection between $5x - 3y = -7$ and $2x - 4y = 14$	$x = -5, y = -6$
7	Find the equation of the line that passes through (1, 1) and (7, 31)	$y = 5x - 4$
8	Simplify the following algebraic fraction $\frac{2x+3}{6x+9}$	$\frac{1}{3}$
9	Solve the following quadratic equation $x^2 - 6x - 40 = 0$	$x = -4, 10$
10	Use the quadratic formula to solve $2x^2 - 9x + 1 = 0$	$x = 0.114, 4.39$
11	Write the following in the form $(x+p)^2 + q$ $x^2 + 16x + 5$	$(x+8)^2 - 59$
12	Write down the radius and the coordinates of the centre of the circle: $(x-3)^2 + (y+5)^2 = 36$	$r = 6$ $c @ (3, -5)$
13	Use factor theorem to factorise this cubic $f(x) = x^3 - 2x^2 - 5x + 6$	$(x-1)(x+2)(x-3)$
14	Find the remainder when $x^2 + 4x - 1$ is divided by $(x+4)$	$rem = -1$
15	Simplify the following $3\sqrt{10} \times 5\sqrt{5}$	$75\sqrt{2}$
16	Rationalise the denominator $\frac{3}{\sqrt{5}}$	$\frac{3\sqrt{5}}{5}$
17	Find the gradient of the tangent to the curve $y = 3x^3 - 8x + 5$ when $x = 2$	28
18	Find the stationary point when $y = x^2 - 8x + 12$ Determine the nature of the stationary point.	$(4, -4)$ Minimum.
19	Find $\int (8x^3 + 6x^2 - 5) dx$	$2x^4 + 2x^3 - 5x + C$
20	Evaluate $\int_1^3 (x^3 + 9) dx$	38

Core 1 Essential skills 2

Student Name: ANSWERS	Target:
---	---------

1	Find the midpoint of $(-3,5)$ and $(-7,-11)$	$(-5, -3)$
2	Find the gradient of the line between $(5,7)$ and $(7,-5)$	$m = -6$
3	Write down the gradient and y-intercept of $2y - 3x = -5$	$m = \frac{3}{2}$ $c = -\frac{5}{2}$
4	Line L_1 has equation $2x + 6y - 15 = 0$ Write down the gradient of any line perpendicular to this one.	$m = 3$
5	Find the equation of the line perpendicular to L_1 that passes through $(5,2)$	$y = 3x - 13$
6	Find the point of intersection between $4x - 2y = 20$ and $3x + 2y = -6$	$(2, -6)$
7	Find the equation of the line that passes through $(2, 1)$ and $(8, 19)$	$y = 3x - 5$
8	Simplify the following algebraic fraction $\frac{5x^2 + 20x}{10x}$	$\frac{x+4}{2}$
9	Solve the following quadratic equation $x^2 - 13x + 36 = 0$	$x = 4, 9$
10	Use the quadratic formula to solve $5x^2 - 9x - 6 = 0$	$x = 2.3, -0.52$
11	Write the following in the form $(x+p)^2 + q$ $x^2 + 12x + 14$	$(x+6)^2 - 22$
12	Write down the radius and the coordinates of the centre of the circle: $(x+7)^2 + (y-5)^2 = 121$	$r = 11$ $C @ (-7, 5)$
13	Use factor theorem to factorise this cubic $f(x) = x^3 - 4x^2 - x + 4$	$(x-4)(x+1)(x-1)$
14	Find the remainder when $x^2 - 4x + 6$ is divided by $(x-3)$	3
15	Simplify the following $3\sqrt{2} \times 4\sqrt{24}$	$48\sqrt{3}$
16	Rationalise the denominator $\frac{2}{\sqrt{6}}$	$\frac{\sqrt{6}}{3}$
17	Find the gradient of the tangent to the curve $y = 2x^3 - 8x^2 + 3x - 1210$ when $x = -1$	25
18	Find the stationary point when $y = 15 + 2x - x^2$ Determine the nature of the stationary point.	$(1, 16)$ max.
19	Find $\int (12x^3 + 4x^2 + 3) dx$	$3x^4 + \frac{4x^3}{3} + 3x + c$
20	Evaluate $\int_0^3 (4x^3 + 2) dx$	87

Core 1 Essential skills 3

Student Name: <div style="color: red; font-size: 1.2em; font-weight: bold; margin-top: 5px;">ANSWERS</div>	Target:
---	---------

1	Find the midpoint of (-5,7) and (-22,-11)	$(-\frac{27}{2}, -2)$
2	Find the gradient of the line between (-3,2) and (-11,-4)	$\frac{3}{4}$
3	Write down the gradient and y-intercept of $9x - 3y = 24$	$m=3, c=-8$
4	Line L_1 has equation $2y - 3x + 8 = 0$ Write down the gradient of any line perpendicular to this one.	$-\frac{2}{3}$
5	Find the equation of the line perpendicular to L_1 that passes through (9,-7)	$2x + 3y = -3$
6	Find the point of intersection between $4x - 3y = -52$ and $6x - 2y = -58$	$x = -7, y = 8$
7	Find the equation of the line that passes through (-1, 1) and (2, -14)	$y = -5x - 4$
8	Simplify the following algebraic fraction $\frac{3x+6}{x^2+6x+8}$	$\frac{3}{x+4}$
9	Solve the following quadratic equation $x^2 - 2x + 2 = 3x - 2$	$x=1, x=4$
10	Use the quadratic formula to solve $2x^2 + 4x - 10 = 0$? $x = 3.44, +1.44$
11	Write the following in the form $(x+p)^2 + q$ $x^2 - 6x + 15$	$(x-3)^2 + 6$
12	Write down the radius and the coordinates of the centre of the circle: $(x+1)^2 + y^2 - 7 = 42$	$r = 7$ $c @ (-1, 0)$
13	Use factor theorem to factorise this cubic $f(x) = x^3 + x^2 - 9x - 9$	$(x+1)(x+3)(x-3)$
14	Find the remainder when $2x^2 + x + 1$ is divided by $(x-3)$	22
15	Simplify the following $(5 + \sqrt{6})(7 - \sqrt{6})$	$29 + 2\sqrt{6}$
16	Rationalise the denominator $\frac{9\sqrt{7}}{\sqrt{3}}$	$3\sqrt{21}$
17	Find the gradient of the tangent to the curve $y = 6x^4 - 10x^3 + 15x$ when $x = -2$	-297
18	Find the stationary points when $y = x^3 + 3x^2 - 9x - 16$ Determine the nature of the stationary points.	$(-3, 11)$ max $(1, -21)$ min.
19	Find $\int (3x^2 + 6x^3 - 15) dx$	$x^3 + \frac{3x^4}{2} - 15x + C$
20	Evaluate $\int_{-1}^1 (4x^3 + 6x^2 + 8) dx$	20

Core 1 Essential skills 4

Student Name: <div style="font-size: 2em; color: red; font-family: cursive;">ANSWERS</div>	Target:
---	---------

1	The midpoint of the line AB is (-2,8). Find the coordinates of A if B is (6,4).	(-10,12)
2	The gradient of the line between (6,4) and (a,10) is -2. Find the value of a.	3
3	Write down the gradient and y-intercept of $12+3y-8x=0$	$m = \frac{8}{3}$ $c = -4$
4	Line L_1 has equation $3x = 7y - 14$ Write down the gradient of any line perpendicular to this one.	$-\frac{3}{7}$
5	Find the equation of the line perpendicular to L_1 that passes through (15,-2)	$y = -\frac{7}{3}x + 33$
6	Find the point of intersection between $y = 2x - 12$ and $2x + 5y = 0$	(5, -2)
7	Find the equation of the line that passes through (-3, 7) and (5, 11)	$y = \frac{1}{2}x + \frac{17}{2}$
8	Simplify the following algebraic fraction $\frac{2x-10}{x^2-2x-15}$	$\frac{2}{x+3}$
9	Solve the following quadratic equation $2x^2 + 11x + 15 = 0$	$x = -3, -\frac{5}{2}$
10	Use the quadratic formula to solve $5x^2 + 12x - 3 = 4x - 4$	-0.137 -1.463
11	Write the following in the form $(x+p)^2 + q$ $x^2 - 9x + 38$	$(x - \frac{9}{2})^2 + \frac{71}{4}$
12	Write down the radius and the coordinates of the centre of the circle: $x^2 - 8x - 100 + (y-2)^2 = 0$	$r = \sqrt{116}$ C@ (4,2)
13	Use factor theorem to factorise this cubic $f(x) = x^3 - 5x^2 + 3x + 9$	$(x+1)(x-3)^2$
14	Find the remainder when $x^3 + 3x^2 - 2x + 1$ is divided by $(x+1)$	5
15	Simplify the following $(1+\sqrt{3})(2-\sqrt{5})$	$2 - \sqrt{5} + 2\sqrt{3} - \sqrt{15}$
16	Rationalise the denominator $\frac{7}{3-\sqrt{2}}$	$3 + \sqrt{2}$
17	Find the gradient of the tangent to the curve $y = 12x^5 - x^2 + 5x - 36$ when $x = -2$	969
18	Find the stationary points when $y = x^3 - 12x + 8$ Determine the nature of the stationary points.	(2, -8) min (-2, 24) max
19	Find $\int (16x^3 + 9x^2 - 5x + 2) dx$	$4x^4 + 3x^3 - \frac{5x^2}{2} + 2x + c$
20	Evaluate $\int_2^6 2x(x+3) dx$	$\frac{704}{3}$

Core 1 Essential skills 5

Student Name: ANSWERS	Target:
--	---------

1	The points P(-2,a), Q(b,6) and M(5,-3) are such that M is the midpoint of P and Q. Find the value of a and b.	$a = -12, b = 12$
2	The gradient of the line between (-3,-2) and (a,-5) is $\frac{1}{3}$. Find the value of a.	$a = -12$
3	Write down the gradient and y-intercept of $\frac{1}{3}y + \frac{1}{4}x - \frac{1}{5} = 0$	$m = -\frac{3}{4}$ $c = \frac{3}{5}$
4	Line L_1 has equation $\frac{2}{3}y - x + 15 = 0$ Write down the gradient of any line perpendicular to this one.	$-\frac{2}{3}$
5	Find the equation of the line perpendicular to L_1 that passes through (10,-5)	$y = -\frac{2}{3}x + \frac{8}{3}$
6	Find the point of intersection between $y = -3x - 10$ and $5x - 4y = -62$	$(-6, 8)$
7	Find the equation of the line that passes through (9, -1) and (-3, 7)	$y = -\frac{2}{3}x + 15$
8	Simplify the following algebraic fraction $\frac{x^2 - x - 6}{x^2 - 9x + 18}$	$\frac{x+2}{x-6}$
9	Solve the following quadratic equation $5x^2 - 10x + 10 = 3x + 4$	$x = 2, \frac{3}{5}$
10	Use the quadratic formula to solve $6x^2 - 3x + 10 = 18 - 9x$	0.758 -1.758
11	Write the following in the form $a(x+p)^2 + q$ $2x^2 - 12x + 9$	$2(x-3)^2 - 9$
12	Write down the radius and the coordinates of the centre of the circle: $x^2 + y^2 + 8x + 10y + 37 = 0$	$r = 2$ $c @ (-4, -5)$
13	Calculate $f(4)$ and hence write the following as a product of 3 linear factors. $f(x) = x^3 - 37x + 84$	$(x-4)(x-3)(x+7)$
14	Find the remainder when $5x^3 + x^2 - 4x - 8$ is divided by $(x+1)$	-8
15	Simplify the following $(2\sqrt{3} - 5)(\sqrt{5} + 4\sqrt{3})$	$2\sqrt{15} + 24 - 5\sqrt{5} - 20\sqrt{3}$
16	Rationalise the denominator $\frac{21}{\sqrt{3}-5}$	$\frac{-21(\sqrt{3}+5)}{22}$
17	Find the gradient of the tangent to the curve $y = 4x^3 - 16x^2 + 13x - 25$ when $x = \frac{1}{2}$ What does this tell us?	$m = 0$ stationary point
18	Find both of the stationary points when $y = 4x^5 - 5x^4$ Determine the nature of the stationary points.	$(0,0)$ inflexion $(1,-1)$ Min.
19	Find $\int \left(12x^5 + 4x^4 - 3x^3 + 7x^2 + \frac{3}{2}x + 8 \right) dx$	$2x^6 + \frac{4x^5}{5} - \frac{3x^4}{4} + \frac{7x^3}{3} + \frac{3x^2}{4} + 8x + c$
20	Evaluate $\int_2^4 (x^2 + 2)(x+3) dx$	140