

Marked Homework 8 - Integration

- [SQA] 1. Find $\int (2x^2 + 3) dx$. 3
- [SQA] 2. Find $\int (3x^3 + 4x) dx$. 3
- [SQA] 3. Evaluate $\int_1^2 \left(x^2 + \frac{1}{x}\right)^2 dx$. 5
- [SQA] 4. Find $\int \frac{x^2 - 5}{x\sqrt{x}} dx$. 4
- [SQA] 5. Find the value of $\int_1^2 \frac{u^2 + 2}{2u^2} du$. 5
- [SQA] 6.
- (a) Find the value of $\int_1^2 (4 - x^2) dx$. 3
- (b) Sketch a graph and shade the area represented by the integral in (a). 2
- [SQA] 7. Evaluate $\int_1^9 \frac{x+1}{\sqrt{x}} dx$. 5
- [SQA] 8. Find the value of $\int_1^4 \sqrt{x} dx$. 4
- [SQA] 9. Evaluate $\int_1^2 (3x^2 + 4) dx$ and draw a sketch to illustrate the area represented by this integral. 5

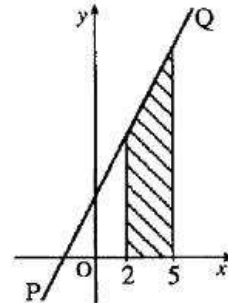
[SQA] 10. Differentiate $\sin^3 x$ with respect to x .

Hence find $\int \sin^2 x \cos x \, dx$.

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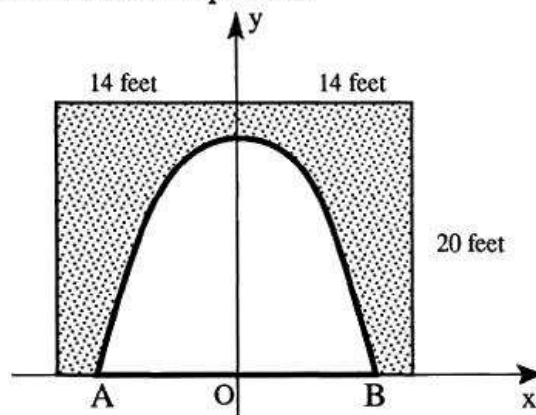
[SQA] 11. The line PQ has equation $y = 2x + 4$.

- (a) Find, without using calculus, the area of the shaded trapezium shown in the diagram.
- (b) Express the area of this trapezium as a definite integral.
- (c) Evaluate this integral.



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1
2

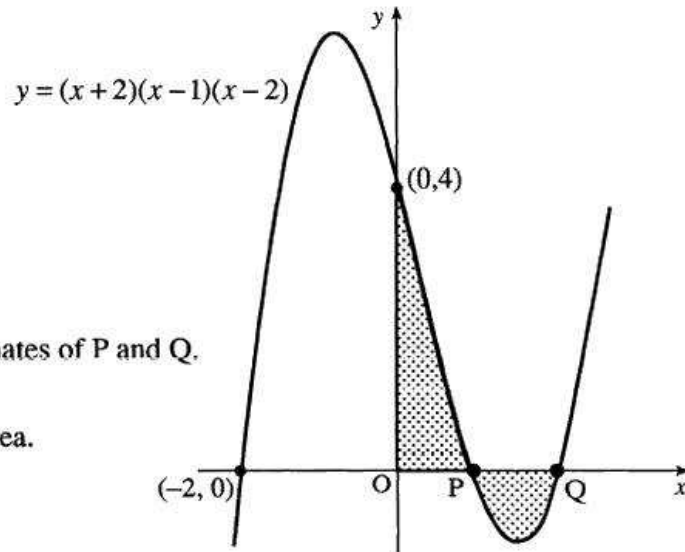
[SQA] 12. The concrete on the 20 feet by 28 feet rectangular facing of the entrance to an underground cavern is to be repainted.



Coordinate axes are chosen as shown in the diagram with a scale of 1 unit equal to 1 foot. The roof is in the form of a parabola with equation $y = 18 - \frac{1}{8}x^2$.

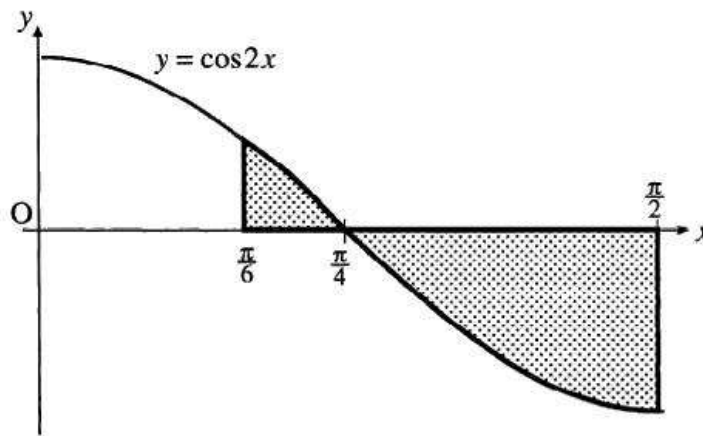
- (a) Find the coordinates of the points A and B. (2)
- (b) Calculate the total cost of repainting the facing at £3 per square foot. (4)

- [SQA] 13. The diagram shows a sketch of the graph of $y = (x+2)(x-1)(x-2)$. The graph cuts the axes at $(-2, 0)$, $(0, 4)$ and the points P and Q.



- (a) Write down the coordinates of P and Q. (2)
- (b) Find the total shaded area. (7)

- [SQA] 14. An artist has designed a 'bow' shape which he finds can be modelled by the shaded area below. Calculate the area of this shape. (6)



15. Find $\int (2x - 1)^{\frac{1}{2}} dx$ where $x > \frac{1}{2}$.

- A. $\frac{1}{3}(2x - 1)^{\frac{3}{2}} + c$
- B. $\frac{1}{2}(2x - 1)^{-\frac{1}{2}} + c$
- C. $\frac{1}{2}(2x - 1)^{\frac{3}{2}} + c$
- D. $\frac{1}{3}(2x - 1)^{-\frac{1}{2}} + c$

16. Find $\int (2x - 5)^4 dx$.

A. $8(2x - 5)^3 + c$

B. $4(2x - 5)^3 + c$

C. $\frac{1}{5}(2x - 5)^5 + c$

D. $\frac{1}{10}(2x - 5)^5 + c$

2

[SQA] 17. Find $\int \sqrt{1 + 3x} dx$ and hence find the exact value of $\int_0^1 \sqrt{1 + 3x} dx$.

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[SQA] 18. Find $\int \frac{1}{(7 - 3x)^2} dx$.

2

[SQA] 19. Evaluate $\int_{-3}^0 (2x + 3)^2 dx$.

4

[END OF QUESTIONS]