1. What is the distance, in units, between the points (-1, 2) and (4, 5)?

A $\sqrt{8}$

B $\sqrt{16}$

C $\sqrt{34}$

D $\sqrt{58}$

2. What is the distance, in units, between the points (a, b) and ($-b$, a)

A $\sqrt{2}\sqrt{a^2+b^2}$

B $\sqrt{2}(a+b)$

C $\sqrt{2}(\sqrt{a}+\sqrt{b})$

D $2\sqrt{a^2+b^2}$

3. The line through the points (-2, 5) and (7, a) has a gradient of 3. What is the value of a

A 8

B 22

C 28

D 32

4. The equation of the line $3y = ax + 1$ where $a \neq 0$ is a constant. Given that the line has a gradient of $\frac{7}{5}$, what is the value of a?

A $-\frac{21}{5}$

B $-\frac{7}{5}$

C $\frac{7}{5}$

D $\frac{21}{5}$

5. The line with equation $y = -\frac{3}{a}x + 4$, where $a \neq 0$ is a constant, is perpendicular to the line with equation $y = \frac{1}{2}x + 1$. What is the value of a?

A -6

B $-\frac{3}{2}$

C $\frac{3}{2}$

D 6

6. The line *h* passes through (3, -2) and is parallel to the line with equation $y = \frac{1}{2}x + 5$.

What is the equation of *h*

A $x - 2y + 1 = 0$

B $x - 2y - 7 = 0$

C $x - 2y + 7 = 0$

D $x - 2y - 5 = 0$

7. Find the equation of the line passing through (6, -4) and is parallel to the line with equation $2x - 3y - 1 = 0$

A $2x - 3y - 24 = 0$

B $3x + 2y - 10 = 0$

C $2x - y - 16 = 0$

D $2x - 3y - 18 = 0$

8. A straight line has equation $y = -x + 4$

What angle does the line make with thepositive direction of the x-axis?

A 45°

B 120°

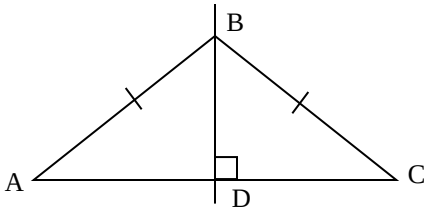
C 135°

D 150°

9. Given that (1, 0) is the midpoint of A(-3, *a*) and B(*b*, 2), what are the values of *a* and *b* ?

	a	*b*
A	-2	4
B	-2	5
C	2	-5
D	4	-2

10. Triangle ABC is shown.
Here are two statements about the lineBD



I. BD is an altitude of triangle ABC

II. BD is the perpendicular bisector of AC

Which of the following is true?

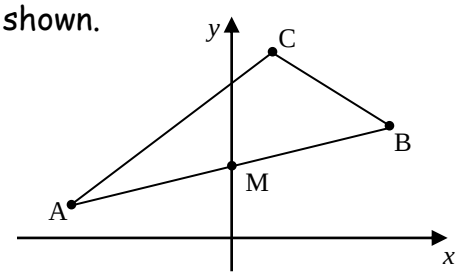
A neither statement is correct.

B only statement I is correct.

C only statement II is correct

D Both statements are correct

11. Triangle ABC with vertices A(-4, 1), B(4, 3) and C(1, 5) is shown.
Point M(0, 2) is the midpoint of AB.
What is the equation of the median through C?



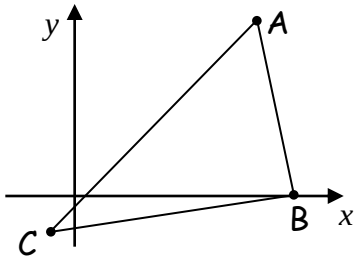
A $3x - y + 2 = 0$

B $x - 4y + 8 = 0$

C $4x + y - 2 = 0$

D $3x - y - 1 = 0$

12. Triangle ABC with vertices A(6, 7), B(7, 0) and C(-1, -2) is shown.



The line through C and B Has gradient $\frac{1}{4}$. Find the equation of the altitude.

A $4x + y - 11 = 0$

B $x - 4y + 22 = 0$

C $4x + y - 31 = 0$

D $8x - 3y - 27 = 0$

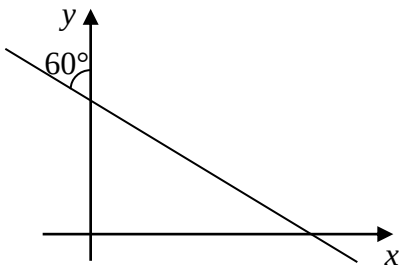
13. What is the gradient of the straight line shown in the diagram?

A $-\sqrt{3}$

B $-\frac{1}{2}$

C $-\frac{1}{\sqrt{3}}$

D $\frac{1}{\sqrt{3}}$



14. A line makes an angle of 60° with the positive direction of the x axis.
What is the gradient of the line?

A $\sqrt{3}$

B $\frac{\sqrt{3}}{2}$

C $\frac{1}{\sqrt{3}}$

D $\frac{1}{2}$

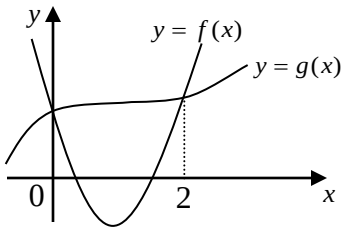
15. A function f is defined by $f(x) = \sqrt{x+2}$.
For which values of x is the function f undefined

A $x > -2$
B $x < -2$
C $x < -1$
D $x < 0$

16. A function f is defined by $f(x) = \dfrac{x-3}{2x^2 - x - 6}$
Which numbers must be excluded from the domain of f?

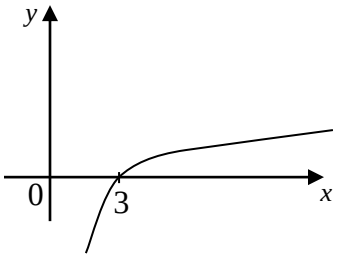
A 0 only
B $-\frac{3}{2}$ and 2 only
C 3 only
D $-\frac{3}{2}$, 2 and 3.

17. The graphs of $y = f(x)$ and $y = g(x)$ are shown in the diagram.
For which values of x is $f(x) < g(x)$



A $x > 0$
B $x < 2$
C $0 < x < 2$
D $x < 0,\ x > 2$

18. The diagram shows the graph of $y = \log_{10}(x + a)$
What is the value of a?



A -3
B -2
C 2
D 3

19. Two functions f and g are defined by $f(x) = 4x + 1$ and $g(x) = x^2 - 2$
Find an expression for $f(g(x))$

A $4x^2 - 7$
B $4x^2 - 1$
C $16x^2 + 8x - 1$
D $4x^3 + x^2 - 8x - 2$

20. Two functions f and g are defined by $f(x) = 2x + 1$ and $g(x) = x^2 + x$
Find an expression for $g(f(x))$

A $x^2 + 2x + 1$
B $2x^2 + 2x + 1$
C $2x^2 + 4x + 2$
D $4x^2 + 6x + 2$

21. Two functions f and g are defined by $f(x) = \frac{3x}{x+1}$ and $g(x) = x^2 - 1$
Find an expression for $f(g(x))$

A $3 - \frac{3}{x^2}$
B $\frac{9x^2}{x^2 + 2x + 2}$
C $3 - \frac{1}{x^2}$
D $\frac{3}{x}$

22. A parabola has equation $y = x^2 + 6x + 2$
What are the coordinates of the parabola's turning point?

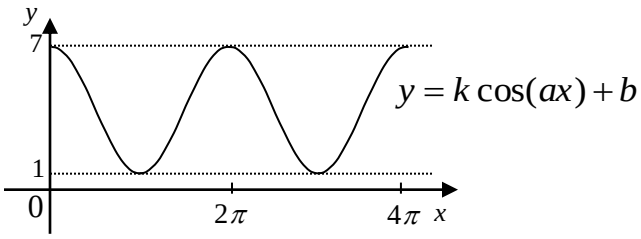
A (3, -7)
B (-3, 29)
C (3, 29)
D (-3, -7)

23. What is the maximum value of $3 - \sin(x + \frac{\pi}{2})$, and the smallest value of $x \geq 0$ at which it occurs?

	Maximum value	x
A	3	0
B	3	$\frac{3\pi}{2}$
C	4	0
D	4	π

24. The curve with equation $y = k\cos(ax) + b$ is shown below.
What are the values of a and k?

	a	k
A	1	3
B	1	6
C	2	3
D	2	7



25. What is the exact value of $\sin(\frac{4\pi}{3})$?

A $-\frac{\sqrt{3}}{2}$

B $-\frac{1}{2}$

C $\frac{1}{2}$

D $\frac{\sqrt{3}}{2}$

26. A function f is defined by $f(x) = x^3 + kx^2 + 2x$.
Given that $f'(2) = 26,$ what is the value of k

A 3

B $\frac{7}{2}$

C 5

D -3

27. A function f is defined by $f(x) = 3x^3 + 2kx + 9$.
Given that $f'(-1) = 13,$ what is the value of k

A $-\frac{7}{2}$

B 2

C 5

D 11

28. Given that $f(x) = 3x^3 + 7x + 1$, find the rate of change of f when x = 2

A 28
B 31
C 39
D 43

29. Given that $f(x) = \sqrt[3]{x} + 2x^2$, find the rate of change of f when x = 8

A $32\frac{1}{12}$
B $32\frac{1}{6}$
C $32 + 3\sqrt{2}$
D 130

30. Differentiate $\sqrt[3]{x^2}$ with respect to x.

A $\frac{3}{2}\sqrt{x}$
B $\frac{2}{3\sqrt[3]{x}}$
C $\frac{2}{3}\sqrt[3]{x}$
D $2\sqrt[3]{x}$

31. What is the gradient of the tangent to the curve $y = 4x^3 + x^2 + 3$ at $x = 2$?

A $24\frac{2}{3}$
B 39
C 52
D 55

32. A curve has $\frac{dy}{dx} = x^2 + 5x + 4$

Find the x-values of the points on the curve where the tangent has a gradient of 4

A -4 and -1
B 1 and 4
C -5 and 0
D 0 and 5

33. A curve satisfying $\frac{dy}{dx} = 4x$ has a tangent at $x = 3$.

What is the gradient of any line perpendicular to this tangent?

A 12

B $-\frac{1}{12}$

C $\frac{1}{12}$

D -12

34. A function is defined by $f(x) = 2x^2 - 9x = 4$

What is the largest range of x-values for which $f(x)$ is strictly increasing?

A $x < \frac{9}{4}$

B $x > \frac{9}{4}$

C $\frac{1}{2} < x < 4$

D $x > \frac{1}{2}, x > 4$

35. A function is defined by $f(x) = 3x^2 - x = 4$

What is the largest range of x-values for which $f(x)$ is strictly decreasing?

A $x < 0$

B $x > 0$

C $x < \frac{1}{6}$

D $x > \frac{1}{6}$

36. A curve has $\frac{dy}{dx} = x^2 + x - 6$. What are the x-values of the curve's stationary points?

A -3 and -2

B 3 and -2

C -3 and 2

D 3 and 2

37. A curve has $\frac{dy}{dx} = x^2 - 4x + 4$, has a stationary point at $x = 2$.

What is the nature of this stationary point?

A Maximum turning point

B Minimum turning point

C rising point of inflexion

D falling point of inflexion

38. A curve has $\frac{dy}{dx} = x^2 - 6x - 9$, has a stationary point at $x = -3$.
What is the nature of this stationary point?

A Maximum turning point
B Minimum turning point
C rising point of inflexion
D falling point of inflexion

39. A sequence is defined by the recurrence relation $U_{n+1} = aU_n + b$ where a and b are constants.
Given that $U_0 = 4$ and $U_1 = 8$, find an expression for a in terms of b.

A $a = \frac{1}{2} - \frac{1}{8}b$
B $a = 2 - \frac{1}{4}b$
C $a = \frac{1}{2} + \frac{1}{8}b$
D $a = 2 + \frac{1}{4}b$

40. A sequence is defined by the recurrence relation $U_{n+1} = -3U_n + 7$ with $U_0 = 2$.
What is the value U_2?

A -1
B 1
C 4
D 10

41. A sequence is defined by the recurrence relation $U_{n+1} = \frac{1}{2}U_n + k$ with $U_0 = k$.
Find an expression for U_2 in terms of k.

A $\frac{3}{4}k$
B $\frac{3}{2}k$
C $\frac{7}{4}k$
D $\frac{5}{2}k$

42. A sequence is defined by the recurrence relation $U_{n+1} = \sqrt{5}U_n - 1$ with $U_0 = 0$.
What is the value U_2?

A $-\sqrt{5} - 1$
B -1
C $\sqrt{5} - 2$
D $-\sqrt{5}$

43. Two sequences are defined by $u_{n+1} = \frac{1}{2}u_n + 7$ and
$v_{n+1} = -v_n + 2$ with $u_0 = -4$ and $v_0 = 10$.

Here are two statements about the sequences:

I. u_n tends to a limit as $n \to \infty$

II. v_n tends to a limit as $n \to \infty$

Which of the following is true?

A neither statement is correct
B only statement I is correct
C only statement II is correct
D both statements are correct

44. A sequence is defined by the recurrence relation $u_{n+1} = \frac{1}{9}u_n - 2$ with $u\ u_0 = 5$
What is the limit of the sequence?

A $-\frac{9}{4}$
B $-\frac{16}{9}$
C $\frac{1}{27}$
D $\frac{9}{4}$

45. A sequence is defined by the recurrence relation $u_{n+1} = \frac{1}{7}u_n + 6$ with $u_0 = 0$
What is the limit of the sequence?

A 7
B $\frac{36}{7}$
C $\frac{1}{7}$
D $-\frac{1}{35}$

46. A sequence is defined by the recurrence relation $u_{n+1} = au_n - \frac{3}{2}$ with $u_0 = 5$
Given that the limit of this sequence is 1, what is the value of a?

A $-\frac{1}{2}$
B $-\frac{1}{3}$
C $\frac{1}{3}$
D $\frac{1}{2}$

47. A function f is defined by $f(x) = \sqrt{x^2 - 4}$
For which range of values of $x \in R$ is f undefined?

A $-2 \leq x \leq 2$
B $-2 < x < 2$
C $x < 0$
D $x > 0$

48. The expression $-x^2 + 6x - 4$ can be written in the form $p - (x + q)^2$.
What is the value of p?

A -13
B -4
C 5
D 13

49. The expression $2x^2 - 8x$ can be written in the form $2(x + p)^2 - q$.
What is the value of q?

A 4
B 8
C 16
D 32

50. A parabola has equation $y = x^2 + 8x + 19$
What is the y-coordinate of the parabola's turning point?

A -4
B -3
C 3
D 15

51. A parabola has equation $y = (x + 2)^2 - 10$.
Determine the coordinates and nature of its turning point.

	Coordinates	Nature
A	(-2, -10)	minimum
B	(-2, -10)	maximum
C	(2, -10)	minimum
D	(2, -10)	maximum

52. Solve $x^2 - 7x + 10 < 0$ for x.

A $2 < x < 5$
B $2 \leq x \leq 5$
C $x < 2, x > 5$
D $x \leq 2, x \geq 5$

53. Solve $x^2 - 6x + 8 < 0$ for x.

A $x < 2, x > 4$
B $x \leq 2, x \geq 4$
C $2 < x < 4$
D $2 \leq x \leq 4$

54. Given that $x^2 + 2kx + 4k = 0$ has equal roots, what is the largest possible value of k?

A 0
B 4
C 8
D 16

55. Given that $2x^2 - 2x + 3k = 0$ has real roots, find the possible values of k.

A $k \leq -\frac{1}{6}$
B $k \geq -\frac{1}{6}$
C $k \leq \frac{1}{6}$
D $k \geq -\frac{1}{6}$

56. The equation $kx^2 + 3x - 2 = 0$ has equal roots. What is the value of k?

A $\frac{9}{8}$
B $-\frac{3}{8}$
C $-\frac{9}{8}$
D $\frac{1}{3}$

57. The polynomial $x^3 - 5x^2 + 12x + 12$ can be written in the form $(x-2)q(x) + k$ where $q(x)$ is a quadratic and k is a constant.
What is the value of k ?

A -40
B 0
C 12
D 24

58. When $kx^3 + (k-2)x - 4$ is divided by $x - 2$, the remainder is 12. What is the value of k?

A $-\frac{6}{5}$
B $\frac{6}{5}$
C 2
D $\frac{10}{3}$

59. Given that $x = 2$ is a root of $2x^3 + kx^2 - 17x - 3 - k = 0$, what is the value of k?

A -7
B -5
C 0
D 7

60. Given that $x = -2$ is a root of $x^3 + 4x^2 - 59x - 126 = 0$, Find the other two roots.

A $x = 9$, $x = -7$
B $x = -9$, $x = 7$
C $x = -9$, $x = -7$
D $x = 9$, $x = 7$

61. Find the x-coordinate of the points of intersection of the parabola $y = x^2 - x + 2$ and the line $y = 6 - 4x$

A $x = -1, 4$
B $x = 1, -4$
C $x = 1, 4$
D $x = -1, -4$

62. Find the largest value of k for which $\int_0^k 8x\,dx = 1$

A $\frac{1}{8}$

B $\frac{1}{4}$

C $\frac{1}{\sqrt{8}}$

D $\frac{1}{2}$

63. Find the largest value of k for which $\int_0^k (2x-3)\,dx = 4$

A 1

B 2

C 4

D 7

64. What is the value of $\int_0^1 x^{\frac{3}{2}}\,dx$?

A $\frac{2}{5}$

B $\frac{1}{2}$

C $\frac{3}{2}$

D $\frac{5}{2}$

65. What is the value of $\int_0^1 x^{\frac{1}{2}}\,dx$?

A $\frac{1}{2}$

B $\frac{2}{3}$

C 1

D $\frac{3}{2}$

66. What is the value of $\int_1^3 (x^2 - 4x + 3)dx$?

A $-\frac{4}{3}$

B 0

C $\frac{2}{3}$

D 4

67. What is the value of $\int_0^3 (4x^2 + 3)dx$?

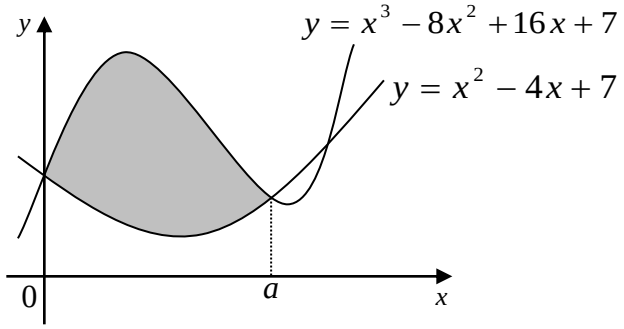
A 24

B 36

C 39

D 45

68. The diagram shows the area bounded by the curves $y = x^3 - 8x^2 + 16x + 7$ and $y = x^2 - 4x + 7$ between $x = 0$ and $x = a$.



Which of the following gives the value of the shaded area

A $\int_0^a (x^3 - 9x^2 + 20x)dx$

B $\int_0^a (x^3 - 9x^2 + 12x + 14)dx$

C $\int_0^a (-x^3 + 9x^2 \_ 20x)dx$

D $\int_0^a (x^3 - 7x^2 + 12x + 14)dx$

69. What is the value of $\cos(\frac{7\pi}{6})$?

A $-\frac{\sqrt{3}}{2}$

B $-\frac{1}{2}$

C $\frac{1}{2}$

D $\frac{\sqrt{3}}{2}$

70. Given that $\sqrt{10}\cos(x-a)=\cos x+3\sin x$, what is the value of $\sin a$?

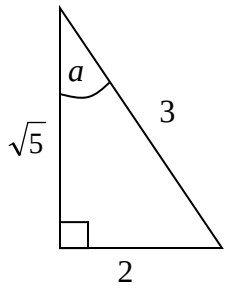
A $-\frac{3}{\sqrt{10}}$

B $-\frac{1}{\sqrt{10}}$

C $\frac{1}{\sqrt{10}}$

D $\frac{3}{\sqrt{10}}$

71. The acute angle a is shown in the triangle.



A $\frac{2}{3}$

B $\frac{4}{3}$

C $\frac{4}{9}\sqrt{5}$

D $\frac{4}{6}\sqrt{5}$

72. Given that $\cos 2x=\frac{1}{8}, 0<x<\frac{\pi}{2}$, what is the value of $\cos x$?

A $\frac{1}{16}$

B $\frac{3}{16}$

C $\frac{1}{\sqrt{8}}$

D $\frac{3}{4}$

73. What is the exact value of $1-2\sin^2(15^o)$?

A $\frac{1}{2}$

B $\frac{5}{8}$

C $\frac{\sqrt{3}}{2}$

D $\frac{7}{8}$

74. Given that $\cos 2x = \frac{7}{9}, 0 < x < \frac{\pi}{2}$, what is the value of $\sin x$?

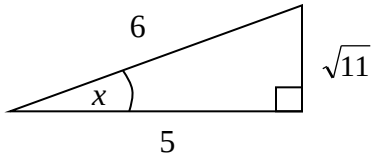
A $\frac{1}{9}$

B $\frac{1}{3}$

C $\frac{\sqrt{8}}{3}$

D $\frac{1}{\sqrt{3}}$

75. The angle x is shown in the triangle.
What is the value of $\cos 2x$?



A $\frac{5}{18}\sqrt{11}$

B $\frac{7}{18}$

C $\frac{4}{3}$

D $\frac{5}{6}$

76. The point (2, -3) lies on the circle with equation $x^2 + y^2 + 6x - 2y + c = 0$
What is the value of c?

A -31
B -13
C -1
D 9

77. A circle has centre (2, 4) and passes through (-1, 1).
What is the equation of the circle?

A $(x-2)^2 + (y-4)^2 = \sqrt{18}$

B $(x-2)^2 + (y-4)^2 = 18$

C $(x+2)^2 + (y+4)^2 = 18$

D $(x+2)^2 + (y+4)^2 = 26$

78. The point P(-2, 4) lies on the circle with equation $x^2 + y^2 - 2x - 2y - 32 = 0$
What is the gradient of the tangent to the circle at P?

A $\frac{1}{3}$
B $\frac{3}{5}$
C 1
D 3

79. A circle has equation $(x+1)^2 + (y-2)^2 = 29$
What is the gradient of the tangent to the circle at the point(1, -3)?

A $\frac{2}{5}$
B 0
C $-\frac{5}{2}$
D $-\frac{1}{2}$

80. A circle has equation $x^2 + y^2 - 2x - 4y + 1 = 0$
Here are two statements about the circle:
I. The circle has a centre (-2, -4).
II. The circle has a radius of 1.

Which of the following are true?

A neither statements are correct
B only statement I is correct
C only statement II is correct
D both statements are correct

81. A circle has equation $x^2 + y^2 - 4x + 6y + 4 = 0$
Here are two statements about the circle:
I. The circle has a centre (-2, 3).
II. The circle has a radius of 3 units.

Which of the following are true?

A neither statements are correct
B only statement I is correct
C only statement II is correct
D both statements are correct

82. A circle has equation $x^2 + y^2 - ax + 2by + c = 0$. The centre of the circle is (-1, 4). What are the values of a and b?

	a	b
A	2	-4
B	-1	-2
C	-2	-4
D	2	4

83. A circle has centre (2, -1) and has the y-axis as a tangent. What is the equation of the circle?

A $(x+2)^2 + (y-1)^2 = 4$
B $(x-2)^2 + (y+1)^2 = 4$
C $(x+2)^2 + (y-1)^2 = 1$
D $(x-2)^2 + (y+1)^2 = 1$

84. What is the largest range of values of k for which the equation $x^2 + y^2 - 6x + 4y + k = 0$ represents a circle?

A $k < 52$
B $k < 13$
C $k > -13$
D All real k

85. A vector v is given by $\begin{pmatrix} -3 \\ 2 \\ 6 \end{pmatrix}$. What is the length, in units, of $3v$?

A 7
B 15
C 21
D 49

86. The point A has coordinates (9, 7, 2) and B(5, 5, -1). What is the value of $|\overrightarrow{AB}|$

A $\sqrt{3}$
B 3
C $\sqrt{29}$
D $\sqrt{21}$

87. What is the distance between the points (3, -1, -1) and (2, 7, -4)?

A $\sqrt{86}$
B $\sqrt{74}$
C 2
D $-\sqrt{62}$

88. The point B has coordinates (-3, 10, -5) and $|\overrightarrow{AB}| = \begin{pmatrix} 3 \\ 9 \\ -5 \end{pmatrix}$.

What are the coordinates of point A?

A (0, 1, -10)
B (0, -1, -10)
C (-6, 1, 0)
D (6, -1, 0)

89. The vectors $\boldsymbol{p}$ and $\boldsymbol{q}$ are defined by $p = 2i - k$ and $q = i + j + k$.
Find $2p - q$ in component form.

A $\begin{pmatrix} 3 \\ -1 \\ -5 \end{pmatrix}$
B $\begin{pmatrix} 3 \\ -1 \\ -4 \end{pmatrix}$
C $\begin{pmatrix} 1 \\ -1 \\ -4 \end{pmatrix}$
D $\begin{pmatrix} 3 \\ -3 \\ -3 \end{pmatrix}$

90. The vector u is given by $\begin{pmatrix} k \\ 2k \\ 2k \end{pmatrix}$ where $k > 0$ is a constant.

Given that u is a unit vector, what is the value of k?

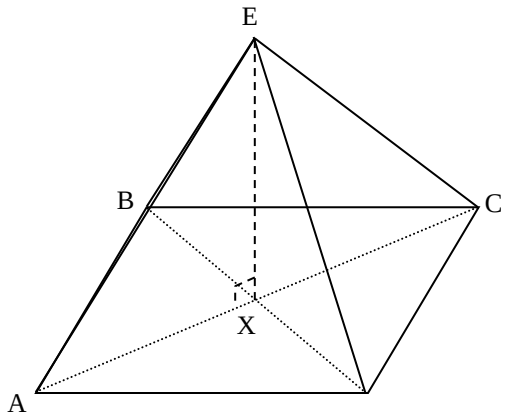
A $\frac{1}{9}$

B $\frac{1}{5}$

C $\frac{1}{\sqrt{5}}$

D $\frac{1}{3}$

91. ABCDE is a square based pyramid and X is the centre of the base.



Givent that $\overrightarrow{AC} = \begin{pmatrix} 4 \\ 4 \\ 0 \end{pmatrix}$ and $\overrightarrow{CE} = \begin{pmatrix} -2 \\ -2 \\ 5 \end{pmatrix}$, find $\overrightarrow{XE}$

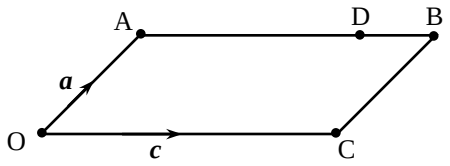
A $\begin{pmatrix} -4 \\ -4 \\ 5 \end{pmatrix}$

B $\begin{pmatrix} 0 \\ 0 \\ 5 \end{pmatrix}$

C $\begin{pmatrix} 2 \\ 2 \\ 5 \end{pmatrix}$

D $\begin{pmatrix} 4 \\ 4 \\ 5 \end{pmatrix}$

92. Parallelogram OABC is shown.



The point D divides $\overrightarrow{AB}$ in the ratio 3 : 1
Find $\overrightarrow{CD}$ in terms of $\boldsymbol{a}$ and $\boldsymbol{c}$.

A $a - \frac{1}{4}c$

B $a - \frac{1}{3}c$

C $\frac{1}{4}c - a$

D $\frac{1}{3}c - a$

93. The point P has coordinates (4, -3, 7) and Q(7, -9, 4).
The point R divides $\overrightarrow{PQ}$ in the ratio 1 : 2
Find the components of $\overrightarrow{PR}$

A $\begin{pmatrix} \frac{3}{2} \\ -3 \\ -\frac{3}{2} \end{pmatrix}$

B $\begin{pmatrix} 1 \\ -2 \\ -1 \end{pmatrix}$

C $\begin{pmatrix} 2 \\ -4 \\ -2 \end{pmatrix}$

D $\begin{pmatrix} -1 \\ 2 \\ 1 \end{pmatrix}$

94. The vectors $\begin{pmatrix} 3 \\ -1 \\ 7 \end{pmatrix}$ and $\begin{pmatrix} k \\ 2 \\ -5 \end{pmatrix}$ are perpendicular. What is the value of k?

A -3

B 3

C $\frac{10}{3}$

D $\frac{8}{3}$

95. The vectors $\begin{pmatrix} a \\ 1 \\ b \end{pmatrix}$ and $\begin{pmatrix} 0 \\ -2a \\ 3b \end{pmatrix}$ are perpendicular. Find an expression for a in terms of b.

A $a = 3b^2$
B $a = \frac{3}{2}b^2$
C $a = \frac{3}{2}b^2 - \frac{1}{2}$
D $a = 3b^2 - 1$

96. For two vectors u and v, $|u| = 4$, $|v| = 7$ and $u.v$ = 3. What is the value of $u.(u + v)$

A 7
B 12
C 19
D 44

97. Differentiate $2(4 - x)^{-\frac{1}{2}}$ with respect to x.

A $(4 - x)^{-1}$
B $-(4 - x)^{-1}$
C $(4 - x)^{-\frac{3}{2}}$
D $-(4 - x)^{-\frac{3}{2}}$

98. What is the gradient of the tangent to the curve with equation $y = \cos 2x$ at the point where $x = \frac{\pi}{4}$

A -2
B -1
C 0
D 2

99. Given that $f(x) = 3\cos(2x)$, what is the value of $f'(\frac{\pi}{6})$?

A 3
B $-3\sqrt{3}$
C -3
D $\frac{3\sqrt{3}}{2}$

100. Given that $f(x) = \frac{1}{2}\sin^2 x$, what is the value of $f'(\frac{\pi}{3})$?

A $-\frac{1}{2}$

B $\sqrt{3}$

C $\frac{\sqrt{3}}{2}$

D $\frac{\sqrt{3}}{4}$

101. Differentiate $(6x2)^5$ with respecr to x.

A $60x^9$

B $5(6x^2)^4$

C $30(6x^2)^4$

D $60x(6x^2)^4$

102. A function is defined for $x \leq 4$ by $f(x) = (8-2x)^{\frac{3}{2}}$. What is the value of $f'(2)$?

A -24

B -6

C 3

D 8

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

104. What is the value of $\int_0^{\pi} \sin x dx$?

A -2

B 0

C 1

D 2

105. Simplify $\log_4 8 + \log_4 2 - 3\log_5 5$

A $-\frac{1}{2}$

B -1

C $\log_4(\frac{16}{5})$

D $\log_4(\frac{16}{125})$

106. Solve $\log_a 5 + \log_a x = \log_a 20$ for $x > 0$

A $x = \frac{1}{4}$

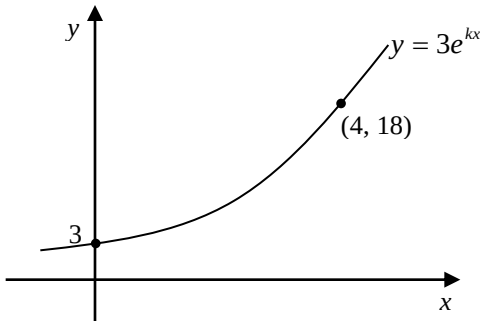
B $x = 4$

C $x = 15$

D $x = 100$

107. The diagram shows the graph of $y = 3e^{kx}$

What is the value of k?



A $\frac{3}{2e}$

B $\frac{1}{4}\log_e 6$

C $\frac{1}{4}\log_e 15$

D $\frac{1}{18}\log_e \frac{4}{3}$

108. Solve $3\log_a 2 = \frac{1}{2}$ for a.

A $a = 64$

B $a = 36$

C $a = \frac{4}{9}$

D $a = \frac{1}{16}$

109. Solve simultaneously the equations $k\sin a^o = \sqrt{3}$ and $k\cos a^o = 1$ for $k > 0$ and $0 \le a \le 360$.

A $k = 2, a = 30$

B $k = 2, a = 60$

C $k = \sqrt{10}, a = 30$

D $k = \sqrt{10}, a = 60$

110. Given that $\cos x - \sin x = \sqrt{2}\cos(x - \frac{7\pi}{4})$, what is the maximum value of $\cos x - \sin x$, and what is the value of x in the interval $0 \le x \le 2\pi$ at which it occurs?

	Maximum value	x
A	1	0
B	$\sqrt{2}$	0
C	1	$\frac{7\pi}{4}$
D	$\sqrt{2}$	$\frac{7\pi}{4}$

Answers

1	2	3	4	5	6	7	8	9	10	11	12
C	A	D	D	C	B	A	C	B	D	A	C
13	14	15	16	17	18	19	20	21	22	23	24
C	A	B	B	C	B	A	D	A	D	D	A
25	26	27	28	29	30	31	32	33	34	35	36
A	A	B	D	A	B	C	C	B	B	C	C
37	38	39	40	41	42	43	44	45	46	47	48
C	D	B	C	C	A	B	A	A	A	B	C
49	50	51	52	53	54	55	56	57	58	59	60
B	C	A	A	C	B	C	C	D	C	D	B
61	62	63	64	65	66	67	68	69	70	71	72
B	D	C	A	B	A	D	A	A	D	C	D
73	74	75	76	77	78	79	80	81	82	83	84
C	B	B	A	B	B	A	A	C	C	B	B
85	86	87	88	89	90	91	92	93	94	95	96
C	C	B	C	A	D	B	A	B	B	B	C
97	98	99	100	101	102	103	104	105	106	107	108
C	A	B	D	D	B	D	D	B	B	B	A
109	110										
B	D										