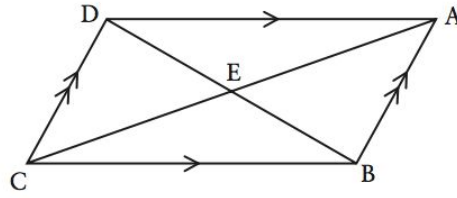


Math SL PROBLEM SET 23

Section A (Short Answer)

1. ABCD is a parallelogram, and E is the intersection point of the diagonals AC and BD. Name a single vector equivalent to each expression. *(Cirrito 12.3.5, p417)*



- a) $\overrightarrow{AE} + \overrightarrow{EB}$ b) $\overrightarrow{BC} + \overrightarrow{BA}$
c) $\overrightarrow{AE} + \overrightarrow{AE}$ d) $\overrightarrow{AD} + \overrightarrow{AB}$
e) $\overrightarrow{BA} + \overrightarrow{AE} + \overrightarrow{ED} + \overrightarrow{DC}$ f) $\overrightarrow{AB} - \overrightarrow{DB}$
g) $\overrightarrow{AB} - \overrightarrow{CB} - \overrightarrow{DC}$ h) $\overrightarrow{AE} - \overrightarrow{EB} - \overrightarrow{BC}$
2. **(A1.1 - N) (CA)** The sum to infinity of a geometric sequence is $\frac{27}{2}$ while the sum of the first three terms is 13. Find the sum of the first 5 terms. *(Cirrito 8.2.4, p263)*
3. **(SP5.6 - R) (CI)** A and B are two events such that $p(A) = 0.30$, $p(B) = 0.5$ and $p(A \cup B) = 0.55$. *(Cirrito 15.3.2, p512)*
- Draw a Venn diagram for this problem, given this information (you may have to calculate a few things first however
 - Hence or otherwise, find the probability of the following events:
 - $A|B$
 - $B|A$
 - $A|B'$
 - $A'|B'$
 - Are the events A and B dependent or independent? Explain why/why not.
4. **(A1.2; F2.7 - N) (CI)** Solve the following equations for x, giving exact values in terms of \ln or in terms of e . *(Cirrito 7.4, p221)*
- $3^x = 6$
 - $\ln(3x + 1) - \ln(4 - x) = \ln(4)$

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5. (V4.1 - N) (CI) Two vectors are defined as $a = \begin{bmatrix} -3 \\ 1 \\ 4 \end{bmatrix}$ and $b = \begin{bmatrix} 6 \\ -6 \\ -5 \end{bmatrix}$. Find the: *(Cirrito 12.4.4, p425)*

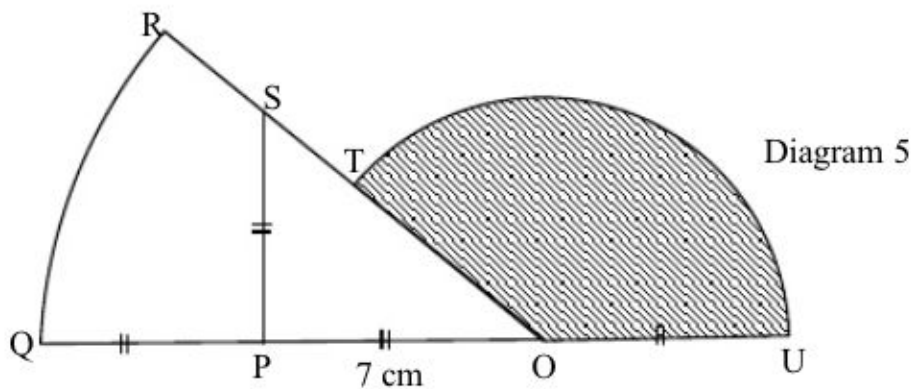
- a. Magnitude of both vectors
- b. Find the values of the scalars X and Y if $Xa + Yb$ is equal to

i. $c = \begin{bmatrix} -36 \\ 32 \\ 33 \end{bmatrix}$ ii. $c = \begin{bmatrix} -12 \\ 24 \\ 1 \end{bmatrix}$

6. (T3.3 - E) (CI) Given that $\sin(x) = \frac{2}{3}$ and that $0 \leq x \leq \frac{\pi}{2}$, find *(Cirrito 10.1.2, p316)*

- a. $\sin(\pi + x)$ b. $\sin(2\pi - x)$ c. $\cos(\frac{\pi}{2} + x)$ d. $\cos(x)$ e. $\tan(x)$

7. (T3.1 - N) (CA) In Diagram 5, QR and TU are two arcs of circles with the same center at O. QPOU and RSTO are straight lines. *(Cirrito 9.7, p309)*



- a. What is the measure of angle TOP? How do you know?
- b. Find the area of each of the sectors.
- c. Find the perimeter of the whole diagram

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Section B (Extended Response/Investigation)

8. **(SP5.6 - R) (CI)** A box contains 5 red cubes, 3 black cubes and 2 white cubes. A cube is randomly drawn has its coloured recorded. The cube is then replaced and 2 more cubes of the same colour are also added into the box. A second cube is then drawn. *(Cirrito 15.3, p511)*
- Find the probability that the first cube selected is red.
 - Find the probability that the second cube selected is black.
 - Given that the first cube selected was red, what is the probability that the second cube selected is black?
 - How probable is it that the 2 cubes selected are not the same colour?
 - How probable is it that 2 red cubes are selected given that the two cubes selected have the same colour?
9. **(A1.3 - N) (CA)** For the following binomial expansions, find: *(Cirrito 4.1.2, p100)*
- The coefficient of the x^2y^4 term in the expansion of $(5x - 2y)^6$
 - The coefficient of the constant term in the expansion of $(2x + \frac{3}{x})^4$