Sirius
College
" Reach for the stars "

Name: Marks:

Instructions

Answer **all** questions in the spaces provided.

In all questions where a numerical answer is required, an exact value must be given unless otherwise specified.

In questions where more than one mark is available, appropriate working **must** be shown.

Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1   2 marks

Find the equation of the line which passes through the point $(-8, 4)$, and is perpendicular to

the line $2x - 3y + 6 = 0$.

Question 2   2 marks

Solve for r where $t \in R \setminus \{0\}$.

$$\frac{\frac{r}{t} + 1}{t} = t$$

Question 3

2 marks

On the Cartesian plane below, sketch the region described by $3x + \dfrac{y}{2} \geq -3$.

Question 4

2 marks

Determine the value of a for which the following is a correct statement.

$$\frac{1}{\sqrt{2}-\sqrt{3}} - \frac{1}{\sqrt{2}+\sqrt{3}} = a\sqrt{3}$$

Question 5

2 marks

Simplify.

$$\frac{9x^2 - 36}{x^4 - x^3 - 2x^2} \div \frac{45}{x^3 + x^2}$$

Name: Marks – Section 1:   Section 2:

SECTION 1

Instructions for Section 1
Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.
Choose the response that is **correct** for the question.
A correct answer scores 1, an incorrect answer scores 0.
Marks will **not** be deducted for incorrect answers.
No marks will be given if more than one answer is completed for any question.

Question 1

If $-5y+3x+9=0$, $y+4x-11=0$ and $-2y+ax-10=0$ are concurrent, then a is equal to:

A   8
B -8
C   3
D   2
E -2

Question 2

The difference between the largest and the smallest coefficients in the expansion of $(5y+2x)^6$ could be:

A   37500
B   64
C   600
D   15625
E   37436

Question 3

The value of a such that there would be no point of intersection between the two lines $ay+3x=4$

and $2y+4x=3$ is:

A   2

B.   1.5

C -0.5

D. -2

E. $\dfrac{8}{3}$

Question 4

The values of x which $\dfrac{x-5}{4x^4-36x^2}$ would be undefined are:

A. R

B. $R\setminus\{-3,0,3\}$

C. $\{-3,3\}$

D. $\{0,3\}$

E. $\{-3,0,3\}$

Question 5

The equation of the line which passes through the point $(-2,4)$ at an angle of $71.5°$ to the positive

direction of x-axis is closest to:

A. $y-3x-10=0$

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

C. $4y+2x=0$

D. $4x+2y=0$

E. $y+x+10=0$

SECTION 2

Question 1

The Sheraton Brick Company manufactures a standard stone block for the building industry.

The production capacity for the year is n standard blocks. The selling price per block is \$1.50, production costs are \$0.60 per brick and fixed costs are \$60,000 per annum.

a. Write down a linear model for the profit, *\$P,* in terms of *n*.   1 mark

b. Find the least value of *n* for a profit to be made.   1 mark
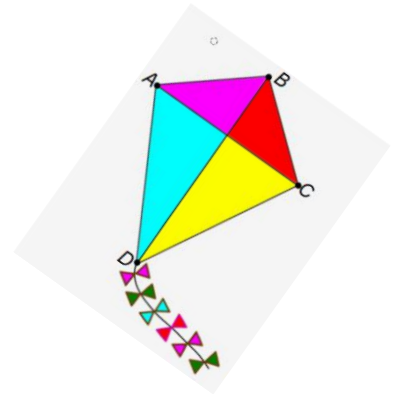
Question 2   2 marks

Show that $\dfrac{1-9n^2}{1-81n^4}\left(\dfrac{1+27n^3}{3n+1}+3n\right)=1$

Question 3

Given the points $A(-3,3)$, $B(4,5)$, $C(6,-2)$ and $D(-6,-13)$.

a. Show that BD is the perpendicular to AC.   2 marks

b. Find the equation of the line passing through BD.   2 marks

c. Show that the line from Part **b** is also the bisector of AC.   2 marks