Essential Skills 21

The skills in this series of worksheets appear frequently.

These are the GIFTS you must take to succeed

Scalar Product (Non-Calculator)
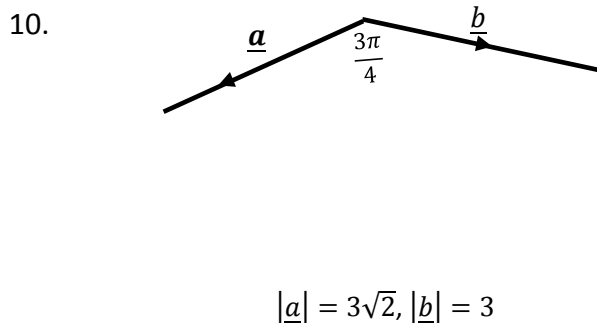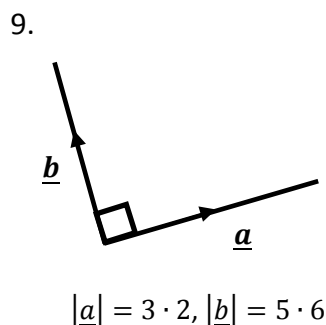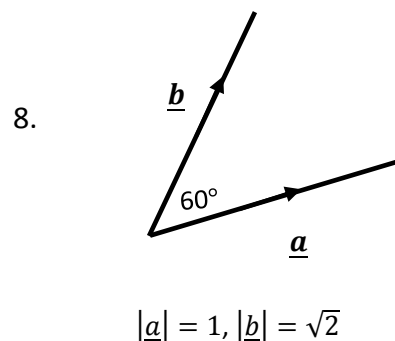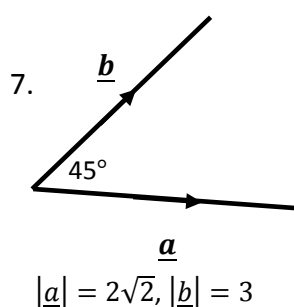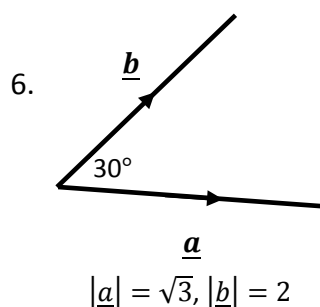
Calculate the scalar product in each:

1. $\underline{a} = \begin{pmatrix} 3 \\ 2 \\ 5 \end{pmatrix}, \underline{b} = \begin{pmatrix} -2 \\ -3 \\ 1 \end{pmatrix}$

2. $\overrightarrow{FG} = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}, \overrightarrow{FE} = \begin{pmatrix} -2 \\ 1 \\ 0 \end{pmatrix}$

3. $\underline{u} = 4\underline{i} - 2\underline{j} - \underline{k}, \underline{v} = 6\underline{i} + 2\underline{j} + 3\underline{k}$

4. $\underline{u} = 3\underline{j} - \underline{k}, \underline{v} = \underline{i} + \underline{j} - \underline{k}$
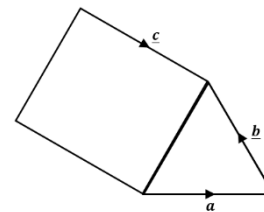
5. A(3, 2, 0), B(4, 0, 5) & C(1, -2, 6) Find $\overrightarrow{AB} \cdot \overrightarrow{AC}$

6.

$|\underline{a}| = \sqrt{3}, |\underline{b}| = 2$

7.

$|\underline{a}| = 2\sqrt{2}, |\underline{b}| = 3$

8.

$|\underline{a}| = 1, |\underline{b}| = \sqrt{2}$

9.

$|\underline{a}| = 3 \cdot 2, |\underline{b}| = 5 \cdot 6$

10.

$|\underline{a}| = 3\sqrt{2}, |\underline{b}| = 3$

APPLYING QUESTIONS

1. The diagram shows an equilateral triangle of side 3 with an adjoined rectangle of length 5 units.

   Calculate $\underline{a} \cdot (\underline{a} + \underline{b} + \underline{c})$

2. Vectors $\underline{u} = 4\underline{i} + 5\underline{j} - 3\underline{k}$ & $\underline{v} = 1\underline{i} + 7\underline{j} + m\underline{k}$ are perpendicular.

   Find the value of m.