Match the objects on the left with one or more of the descriptions on the right.

_______1. $|\langle 1,3,4\rangle \times \langle 2,-1,3\rangle|$

_______2. $\mathbf{r} = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ 1 & 3 & 4 \\ 2 & -1 & 3 \end{vmatrix}$

_______3. $(\mathbf{a} \times \mathbf{b}) \cdot c$, where $\mathbf{a} = \langle 1,3,4\rangle$, $\mathbf{b} = \langle 2,-1,3\rangle$ and $c = 5$.

_______4. $\dfrac{\mathbf{a} \cdot \mathbf{b}}{|\mathbf{a}|\,|\mathbf{b}|}$, where $\mathbf{a} = \langle 1,3,4\rangle$ and $\mathbf{b} = \langle 2,-1,3\rangle$

_______5. $(\mathbf{a} \cdot \mathbf{b}) \times \mathbf{c}$, where $\mathbf{a} = \langle 1,3,4\rangle$, $\mathbf{b} = \langle 2,-1,3\rangle$ and $\mathbf{c} = \langle 3,2,7\rangle$

_______6. $\mathbf{r}(t) = \langle 2,-1,3\rangle + t\langle 1,3,4\rangle$

_______7. $\mathbf{r}(t) = \langle 1,3,4\rangle + t\langle 2,-1,3\rangle$

_______8. The intersection of the graphs of $2x - 2y + z = 9$ and $11x + 7y - 8z = -9$

_______9. The set of points satisfying $\frac{x-2}{1} = \frac{y+1}{3} = \frac{z-3}{4}$.

_______10. $\langle 1,3\rangle \cdot \langle x-3, y-2\rangle = 0$

_______11. $\langle 1,3,4\rangle \cdot \langle x-3, y-2, z-7\rangle = 0$

_______12. $x + 3y + 4z = \langle 3,2,7\rangle$

_______13. $\mathbf{g}(t) = \langle 2t+1, -t+3, 3t+4\rangle$

_______14. $z = f \circ \mathbf{g}$, where $f(x,y) = \sqrt{x^2+y^2}$ and $\mathbf{g}(t) = \langle 2t+1, -t+3, 3t+4\rangle$

_______15. $z = \mathbf{g} \circ f$, where $f(x,y) = \sqrt{x^2+y^2}$ and $\mathbf{g}(t) = \langle 2t+1, -t+3, 3t+4\rangle$

_______16. $z = \sqrt{x^2+y^2}$

_______17. $z = x^2 + 5$

_______18. $5 = x^2 + y^2$

_______19. $z = x^2 + y^2 + w^2$

_______20. $z^2 = x^2 + y^2$

a. This thing doesn't even make sense.

b. A scalar

c. A vector

d. A scalar function

e. A vector function

f. A vector perpendicular to both $\langle 1,3,4\rangle$ and $\langle 2,-1,3\rangle$

g. The area of a parallelogram whose edges are the vectors $\langle 1,3,4\rangle$ and $\langle 2,-1,3\rangle$

h. The volume of a parallelepiped, with edges **a**, **b** and **c**

i. The cosine of the angle between **a** and **b**

j. A line in the direction $\langle 1,3,4\rangle$

k. A line through the points $(1,3,4)$ and $(3,2,7)$

l. The line $3y + x = 9$, lying in the xy-plane

m. The line $\langle 3,2,7\rangle + t\langle 1,3,4\rangle$ lying in 3-space.

n. The plane in 3-space containing the point $(3,2,7)$ and perpendicular to $\langle 1,3,4\rangle$.

o. $z : \mathbb{R} \to \mathbb{R}$ is a function whose graph is a curve lying in 2-space.

p. A function mapping $\mathbb{R}^3 \to \mathbb{R}$

q. A function mapping $\mathbb{R} \to \mathbb{R}^3$

r. $z : \mathbb{R}^2 \to \mathbb{R}$ is a function of 2 variables, whose graph is a surface lying in 3-space

s. The graph of this is a surface lying in 3-space, but it is not a function.

t. A circle, which is a contour line of the function $f(x,y) = x^2 + y^2$.

u. $\mathbb{R} \xrightarrow{\mathbf{g}} \mathbb{R}^3 \xrightarrow{f} \mathbb{R}$

v. $\mathbb{R}^2 \xrightarrow{f} \mathbb{R} \xrightarrow{\mathbf{g}} \mathbb{R}^3$