A+ Academy – Online Teaching

فيزياء طبية (تحضيري)

Topic: Medical physics

Instructor: Hamza Ahmad

Lecture: (8)

Vectors and motion in two dimension Part (4)

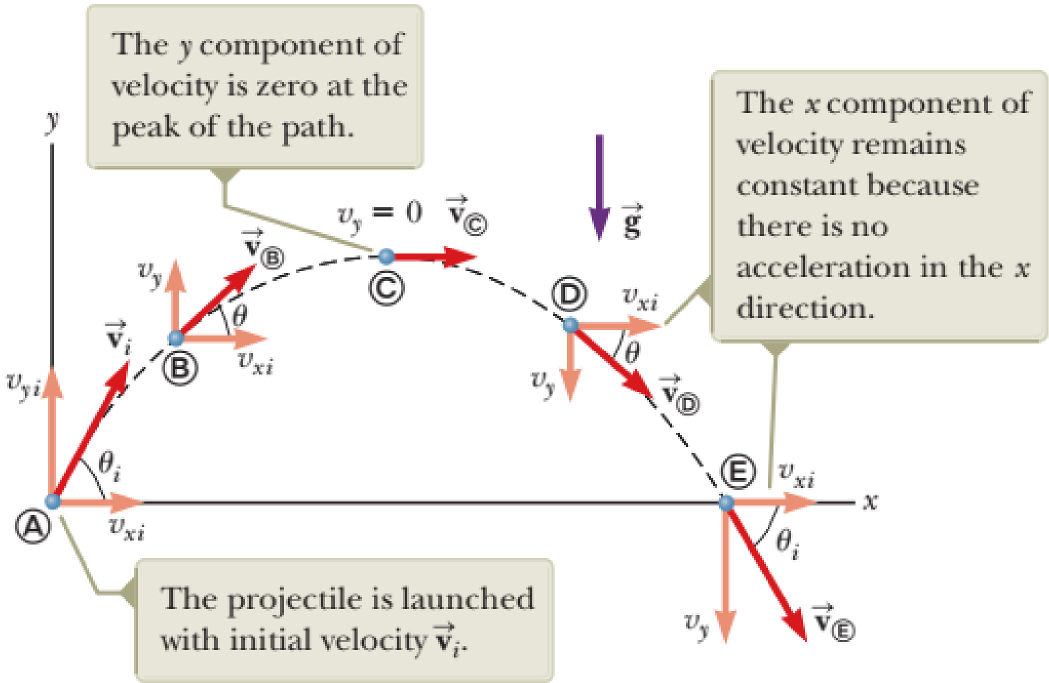
WhatsApp (00962781598320)

Projectile motion

في حركة المقذوفات يرمى الجسم بزاوية θ بالتالي يجب تحليل السرعة الابتدائية

$$v_{ix} = v_i \cos\theta$$

$$v_{iy} = v_i \sin\theta$$



- The time needed to reach maximum height. الزمن للوصل الى اقصى ارتفاع

$$t_{up} = \frac{v_{iy}}{10}$$

- Total time = Time to reach the ground = time to complete the whole trip.(الزمن الكلي)

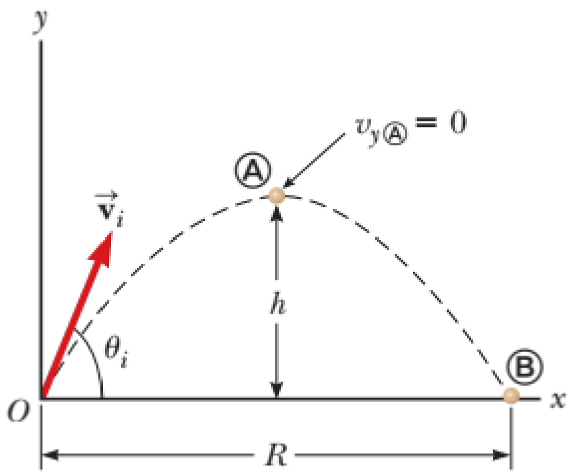
$$t_{total} = 2t_{up}$$

- Maximum height = maximum point

$$\Delta y_{max} = v_i t_{up} + \frac{1}{2} g\, t_{up}^2$$

- Horizontal Range (horizontal distance)

$$R = v_{ix} t_{tot}$$



Ex (1): A stone is thrown by 10 m/s above the ground with 37^o.Find.

1. Maximum height.
2. Horizontal Range.
3. The velocity just before hitting the ground.
4. The speed

Ex (2): A ball is thrown at 37^o above the horizontal from the ground with v_o. If the range is 170m what is the magnitude of the initial velocity.

Ex (3): a stone is thrown at angle 37^o above the tower with 10 m/s the flight time is 5s.

1. What is the tower height?
2. What is the maximum height?
3. What is the horizontal range.
4. The velocity just before hitting the ground.

Ex (4):An object is thrown at 37^o above the horizontal with 20 m/s from 100 m find

1. The time needed to reach the ground.
2. The velocity just before hitting the ground.

Ex (5): An object is thrown 53^obelow the horizontal from a building with 5m/s after 4 s its reach the ground. Find the building height

Ex (6): a ball is thrown from 600m with initial velocity 20m/s in the direction in the horizontal. What is the horizontal distance?

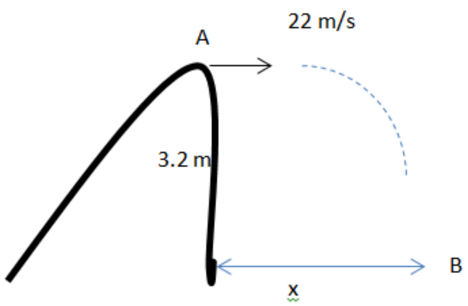
Ex (7): An object is thrown at 53^o below the horizontal from 50 m height, with 10 m/s. Find:

1. The time needed to reach the ground.
2. The velocity just before hitting the ground.
3. The speed.

Ex (8): A stone is throwing horizontally with 10 m/s from 100 m. Find:

1. The flight time.
2. The velocity just before hitting the ground.

Q:1	A baseball thrown from the outfield is released from shoulder height at an initial velocity of 29.4 m/s at an initial angle of 30.0° with respect to the horizontal. What is the maximum vertical displacement that the ball reaches during its trajectory? A) **11.0 m** B) 9.80 m C) 22.1 m D) 44.1 m
Q:2	A stone is thrown with an initial speed of 15 m/s at an angle of 53° above the horizontal from the top of a 35 m building. If g = 9.8 m/s^2 and air resistance is negligible, then what is the magnitude of the vertical velocity component of the rock as it hits the ground? A) 9.0 m/s B) 18 m/s C) 26 m/s D) **29 m/s**
Q:3	A stone is thrown with an initial speed of 15 m/s at an angle of 53° above the horizontal from the top of a 35 m building. If g = 9.8 m/s2 and air resistance is negligible, then what is the magnitude of the horizontal component of velocity as the rock strikes the ground? A) 7.5 m/s B) **9.0 m/s** C) 12 m/s D) 29 m/s
Q:4	A stone is thrown with an initial speed of 15 m/s at an angle of 53° above the horizontal from the top of a 35 m building. If g = 9.8 m/s^2 and air resistance is negligible, what is the magnitude of the horizontal displacement of the rock? A) **38 m** B) 46 m C) 66 m D) 90 m
Q:5	A ball is launched from ground level at 30 m/s at an angle of 35° above the horizontal. How far does it go before it is at ground level again?. If g = 10 m/s^2 A) 14 m B) 21 m C) 43 m D) **84.5 m**
Q:6	A fireman, 50.0 m away from a burning building, directs a stream of water from a fire hose at an angle of 30.0° above the horizontal. If the initial speed of the stream is 40.0 m/s, at what height will the stream of water strike the building? A) 9.60 m B) 13.4 m C) **18.7 m** D) 22.4 m
Q:7	A projectile is thrown horizontally at 10.0 m/s. The projectile hits the ground 0.510 s later. What is the angle of impact the projectile makes with the horizontal ground? A) –30.0° B) **–26.6°** C) –27.0° D) –60.0°
Q:8	Ignoring air resistance, the horizontal component of a projectile's velocity A) is zero. **B) remains constant.** C) Continuously increases. D) Continuously decreases.
Q:9	A ball is thrown with a velocity of 20 m/s at an angle of 60e above the horizontal. What is the horizontal component of its instantaneous velocity at the exact top of its trajectory? **A) 10 m/s** B) 17 m/s C) 20 m/s D) zero
Q:10	Ignoring air resistance, the horizontal component of a projectile's acceleration **A) is zero.** B) Remains a non-zero constant. C) Continuously increases. D) Continuously decreases.
Q:11	If a ball is thrown with a velocity of 25 m/s at an angle of 37^o above the horizontal, what is the vertical component of the velocity? A) 12 m/s **B) 15 m/s** C) 19 m/s D) 25 m/s
Q:12	A stone is thrown horizontally with an initial speed of 10 m/s from the edge of a cliff. A stop watch measures the stone's trajectory time from the top of the cliff to the bottom to be 4.3 s. What is the height of the cliff? A) 22 m B) 43 m C) 77 m D) **91 m**
Q:13	A girl throws a rock horizontally, with a velocity of 10 m/s, from a bridge. It falls 20 m to the water below. How far does the rock travel horizontally before striking the water? A) 14 m B) 16 m C) **20 m** D) 24 m
Q:14	A ball thrown horizontally from a point 24 m above the ground, strikes the ground after traveling horizontally a distance of 18 m. With what speed was it thrown?

	A) 6.1 m/s B) 7.4 m/s C) **8.1 m/s** D) 8.9 m/s
Q:15	A jumper in the long-jump goes into the jump with a speed of 12 m/s at an angle of 20°above the horizontal. How long is the jumper in the air before returning to the Earth? A) 0.21 s B) 0.42 s C) **0.84 s** D) 1.3 s
Q:16	A jumper in the long-jump goes into the jump with a speed of 12 m/s at an angle of 20° above the horizontal. How far does the jumper jump? A) 3.4 m B) 6.2 m C) **9.4 m** D) 15 m
Q:17	A projectile is launched with an initial velocity of 60.0 m/s at an angle of 30.0° above the horizontal. How far does it travel? A) 152 m B) 160 m C) 184 m D) **318 m**
Q:18	A projectile is launched with an initial velocity of 60.0 m/s at an angle of 30.0° above the horizontal. What is the maximum height reached by the projectile? A) 23 m B) **46 m** C) 69 m D) 92 m
Q:19	A rifle bullet is fired at an angle of 30° below the horizontal with an initial velocity of 800 m/s from the top of a cliff 80 m high. How far from the base of the cliff does it strike the level ground below? A) 130 m B) **140 m** C) 150 m D) 160 m
Q:20	A skier leaves the end of the horizontal ski jump at 22 m/s and falls 3.2 m before landing. Neglecting friction, the time needed to hit the ground is A) 0.65 s B) 1.2 s C) 0.4 s D) 0.8s 
Q:21	A projectile is fired with an initial velocity of 15 m/s at angle ϴ= 45° with horizontal. Its speed at highest point is A) 8.66 m/s B) 10.6 m/s C) 0 m/s D) 15 m/s
Q:22	A ball is thrown horizontally with a speed of 4 m/s from an edge of a table with height of 1.25 m above the ground, the magnitude of the maximum velocity of the ball equal to A) 4 m/s B) 7.1 m/s C) 6.4 m/s D) 4.8 m/s
Q:23	A student stand at the top of the building edge and throws a stone horizontally over the edge a speed of 20 m/s. the edge of the building is 60 m above the ground, how long much time dose the stone needed to strike the ground A) 4.5 s B) 2.5 s C) 3.5 s D) 1.5 s
Q:24	Ball is kicked with an initial velocity at an angle of 35° to the horizontal. Neglecting air resistance, what is the vertical component of its acceleration as its travels in its trajectory? A) g sin35 downward B) g cos35 downward C) g downward D) g upward
Q:25	A projectile is ejected with a speed of 20 m/s at an angle of 30° above the horizontal, the range of this projectile is A) 34 m B) 20 m C) 15 m D) 50 m
Q:26	7 A stone is thrown with an initial speed of 15 m/s at an angle of 53° above the horizontal from

	the top of a 35 m building. If g = 9.8 m/s^2 and air resistance is negligible, then what is the magnitude of the vertical velocity component of the rock as it hits the ground? A) 9.0 m/s B) 18 m/s C) 26 m/s D) **29 m/s**
Q:27	Ignoring air resistance, the horizontal component of a projectile's velocity A) is zero. **B) remains constant.** C) continuously increases. D) continuously decreases.
Q:28	What happens to the range of a projectile when the lunch angle is increase from 30^o to 60^o. A) increase B) decrease C) remains the same
Q:29	What happens to the maximum height of a projectile when the lunch angle is increase from 15^o to 75^o. A) increase B) decrease C) remains the same
Q:30	What happens to the horizontal dismastment of the a projectile if the initial velocity is doubled A) its doubled B) it is quadrupled C) remains the same
Q:31	On a projectile path, the velocity and acceleration vector be perpendicular to each other on A) At the end of the path **B) To peak of the path.** C) When the vertical component of the velocity dose not equal zero.
Q:32	A jumper in the long-jump goes into the jump with a speed of 12 m/s at an angle of 20^O above the horizontal. How long is the jumper in the air before returning to the Earth? A) 0.21 s B) 0.42 s C) **0.84 s** D) 1.3 s

1	2	3	4	5	6	7	8	9	10
A	D	B	A	D	C	B	B	A	A
11	12	13	14	15	16	17	18	19	20
B	D	C	C	C	C	D	B	B	D
21	22	23	24	25	26	27	28	29	30
B	C	C	C	A	D	B	C	A	B
31	32								
B	C								