

TECHNICAL REPORT

Boundary Risk Assessment:
34 Sea Lane, Ferring

Report Number LSUK.18-0096

Designer Homes LLP

Client Kingham House
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Worthing
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Date 12/02/2018

This report contains 12 pages including 1 appendix.

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SUMMARY

To assess the potential risk of cricket balls being hit over the boundary of a cricket field to an adjacent proposed housing development at 34 Sea Lane, Ferring, Labosport has reviewed the site including distances to ascertain the risk of balls landing in the adjacent areas.

This report forms the bases of a risk assessment and if required a recommended mitigation strategy to minimise potential risks.

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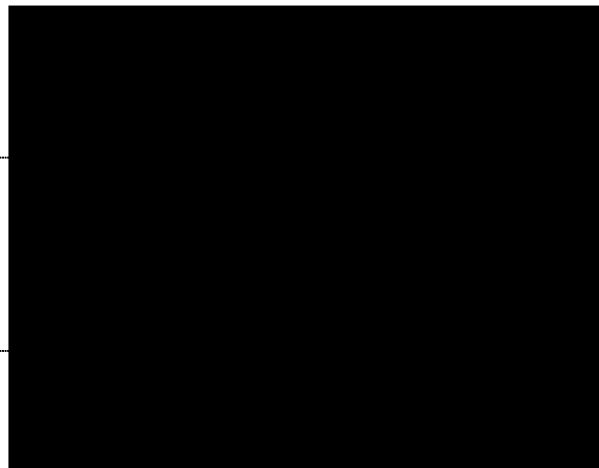
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1. INTRODUCTION

To assess the potential risk of cricket balls being hit over the boundary of a cricket field to an adjacent proposed housing development at 34 Sea Lane, Ferring, Labosport has reviewed the site including distances to ascertain the risk of balls landing in the adjacent areas.

Using a ball projectile model and supporting data from research undertaken, based on professional level cricket, by Labosport for the England and Wales Cricket Board (ECB) the following risk assessment has been produced. As with any model and sensible risk assessment the proportionality linked to risk (comprising likelihood and severity) are included in this report.

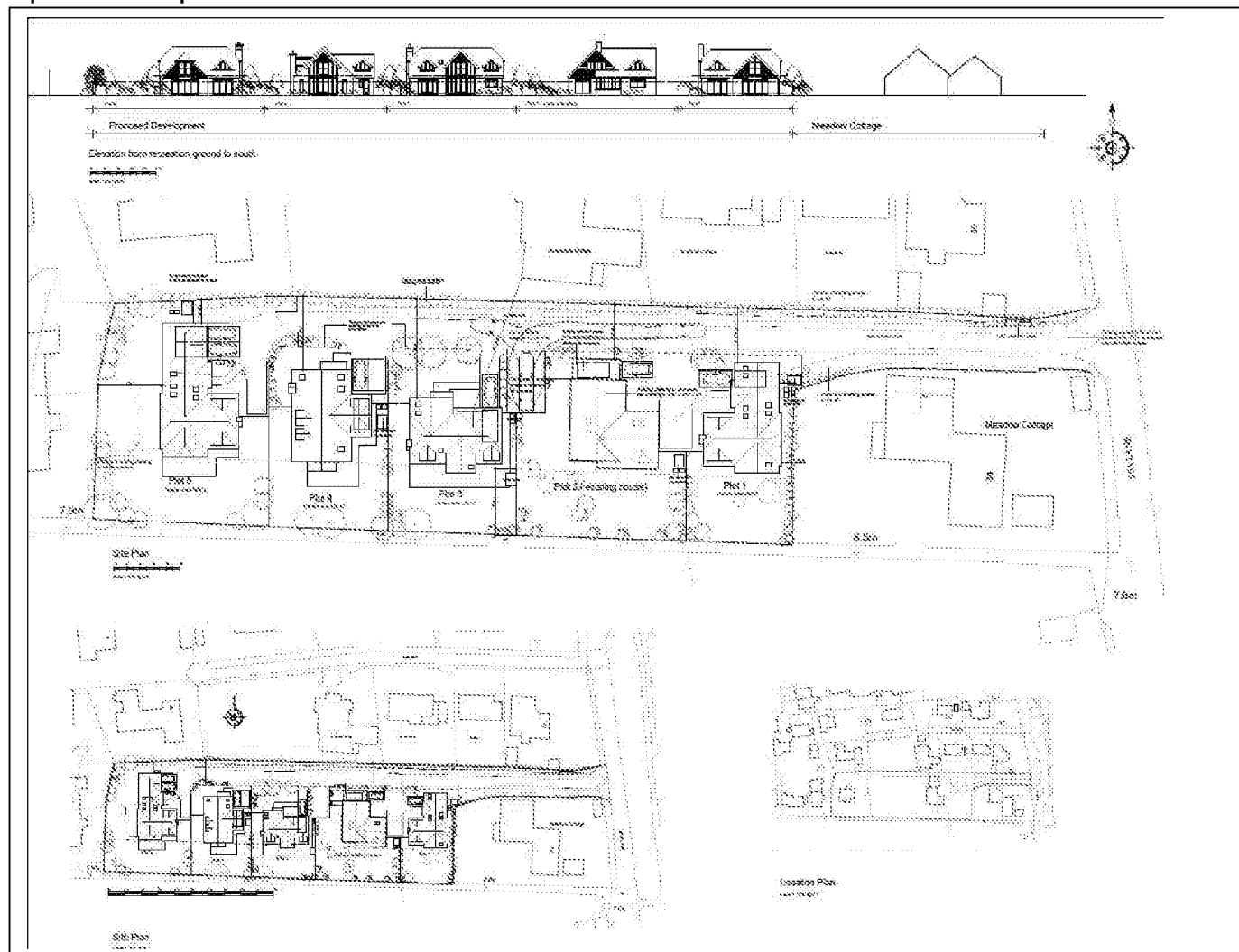
Note: All measurements have been taken during a site inspection on 31/01/2018 based on initial information received from the client.

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2. SITE SPECIFICS

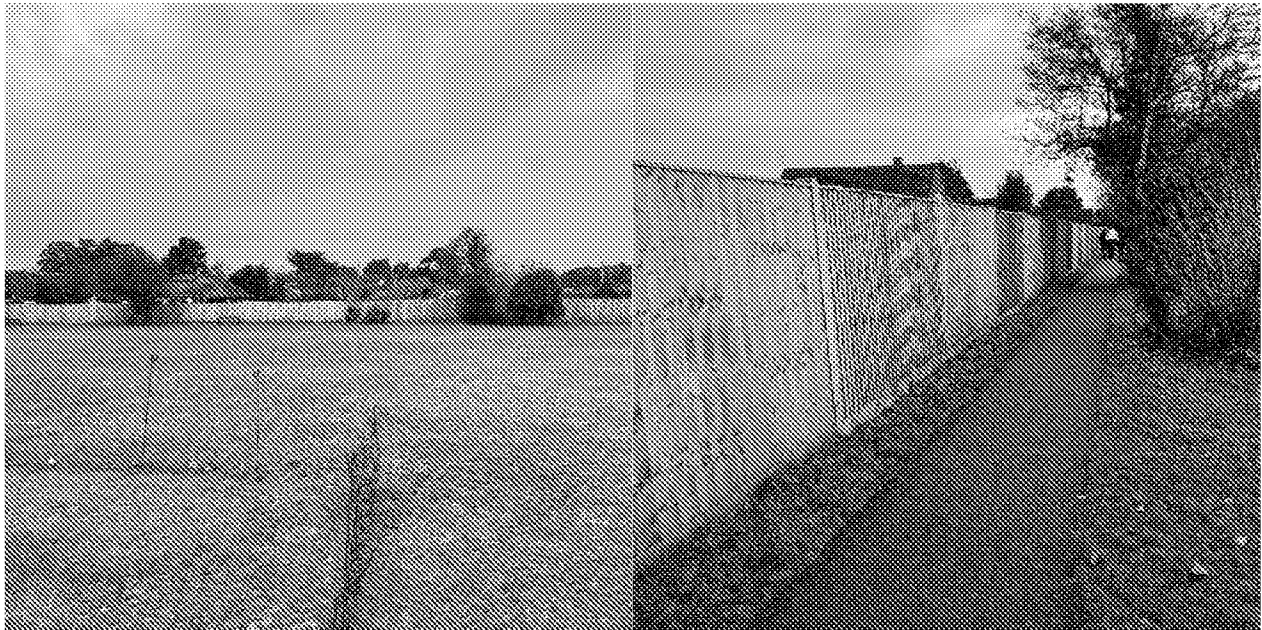
The below diagrams illustrate the current layout of the cricket square in relation to the proposed housing development area. The current boundary surrounding the site in this direction is a 1.8 m height wooden fence across the whole boundary in the North direction. The same height fence is also currently proposed as part of the development.

Proposed Development



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Site Images



Measurements



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Orientation of Risk

The focus on the boundary assessment is based on the shortest distances from the edge of the cricket square to the proposed boundaries and hence worst-case scenario. This can be identified in the above site plan as the North orientation.

3. SITE MEASUREMENTS

The above diagram illustrates the minimum measured distances from the cricket square to the proposed boundaries. Note as this is a risk assessment the worst case scenarios are considered; consequently the shortest measured (and calculated) distance is used for the study.

Measured Distance	Shortest Boundary (m)
North - Edge of the cricket square to the proposed boundary.	51.5 m
**North – Opposing edge of the cricket square to the site boundary.	76.0 m

******The likely direction of travel from a ball is not the same for all directions from the cricket wicket (i.e. balls hit directly behind a player are not going to occur with the same velocity and angle of impact as a forward or sideways shot from a player) and it is unlikely to be of the same magnitude/distance. The distance from the furthest stump has therefore also been considered as the type of shot required to hit the ball directly behind a player is uncommon and the occasional “top edge” shot resulting in this trajectory will be most likely not to travel the full distance.

4. ESTIMATED BALL HEIGHT (USING THE PROJECTION MODELLING TOOL)

Previous work undertaken for the England and Wales Cricket Board (ECB) led to the development of a model used to estimate the distance a ball would travel and its trajectory given a specific velocity and angle.

Model limitations:

The size of a cricket ball and its estimated drag coefficient has been added to the model, this in combination with classical Newtonian Physics for the influence of air resistance and gravity have been used to predict the projectile path. However, for simplicity, there are some limitations to the model including but not limited to bat/ball restitution, atmospheric conditions, wind (speed and direction) and spin of the ball. ***Due to these limitations the model is regarded as an indicative prediction tool.***

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The below table highlights the total estimated distance a ball will travel for typical shots (angles and velocities) taken from assessment of in-game action ranging from 20 degrees to 50 degrees and 20 m/s (45 mph) to 50 m/s (112 mph).

Total Estimated Distance (m)		Angle (degrees)						
		20	25	30	35	40	45	50
Velocity (m/s)	20	20.70	23.24	25.82	27.22	28.04	27.84	27.10
	25	28.82	32.8	35.29	37.01	37.95	37.66	36.25
	30	37.32	41.99	44.91	46.31	47.34	46.51	45.27
	35	45.95	50.48	53.80	55.40	55.96	55.04	53.15
	40	53.71	58.79	61.82	63.62	63.73	62.73	60.24
	45	60.50	66.15	69.52	70.93	70.62	69.17	66.53
	50	67.88	73.23	76.29	77.88	77.15	75.62	72.09

Note: the trajectory for the above distances will be very different depending on the angle and velocity of shot as can be seen in the assessment below.

The hit angles and velocities are estimated from in-game action to cover a range of 'typical' shots ranging from 20 degrees to 50 degrees and 20 m/s (45 mph) to 50 m/s (112 mph).

The following distances have been used to calculate the height of the ball for different shot conditions as specified below:

Measured Distance	Shortest Boundary (m)
North - Edge of the cricket square to the proposed boundary.	51.5 m
**North – Opposing edge of the cricket square to the site boundary.	76.0 m

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North Orientation

Estimated Ball Height @ 51.5 m		Angle (degrees)						
		20	25	30	35	40	45	50
Velocity (m/s)	20	0	0	0	0	0	0	0
	25	0	0	0	0	0	0	0
	30	0	0	0	0	0	0	0
	35	0	0	2.5	4.8	6.3	6.3	4.2
	40	1.5	5.2	8.9	11.8	14.7	16.1	16.2
	45	5.2	9.1	13.0	16.6	20.1	23.2	24.8
	50	7.5	11.8	16.0	20.2	24.2	27.9	30.9
Estimated Ball Height @ 76.0 m		Angle (degrees)						
		20	25	30	35	40	45	50
Velocity (m/s)	20	0	0	0	0	0	0	0
	25	0	0	0	0	0	0	0
	30	0	0	0	0	0	0	0
	35	0	0	0	0	0	0	0
	40	0	0	0	0	0	0	0
	45	0	0	0	0	0	0	0
	50	0	0	1.1	3.2	3.4	0	0

See Appendix A for example trajectories.

5. RISK ASSESSMENT DISCUSSION

This report has been prepared to assess the potential risk of cricket balls being hit into a proposed housing development at 34 Sea Lane, Ferring adjacent Little Twitten Recreation Ground and the height and/or design that a mitigating system would need to be to provide a suitable level of protection.

The exact frequency of shots resulting in a cricket ball being hit into the adjacent area is unknown and impossible to predict with certainty (player skills, type of game and many other factors can influence this) hence a proportionate approach needs to be taken to provide safety to these users. In reality there will always be a “freak” shot that will result in a further than expected trajectory, however, the implications of planning for this type of worst case approach would result in the closure of hundreds of cricket ground across the country hence a balanced risk mitigation strategy needs to be implemented that is proportionate. Indeed there are risks associated with many everyday activities, but plans need to be developed to reduce risk following good practical health and safety principles including a combination of likelihood and severity.

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Labosport Ltd have undertaken this type of assessment for other cricket grounds over the past 3 years when there have been perceived problems with cricket balls exceeding the boundary or the influence a new development may have on an existing club. Labosport have undertaken assessments where the minimum boundary has been in the region of 35 to 40 m yet the cricket club and neighbours have been able to collectively identify a mitigation strategy to reduce risk. This indicates that based on past experience the below recommendations are feasible.

The basis of the shot velocity (50 m/s) is calculated on professional (1st class and international) players. Typically for community cricket clubs we undertake the assumption that 40 m/s is a suitable speed given the speed of bowling and batsman's skill when contrasted with elite players. It is on this basis that the below recommendations have been made.

Risks Overview/Mitigation Approach

North Orientation

The shortest distance from the cricket square to the North boundary is 51.5 m. At 51.5 m all but the fastest shots for community level cricket will be stopped by a 12 m high fencing system. A 12 m high fence will not stop all shots from landing in the area but it is believed from the assessment of ball trajectory it will significantly reduce their frequency. In order to almost completely remove the risk of cricket balls landing in the area beyond this boundary a fencing system 16.5 m high would be required but this may not be practical or proportionate.

The distance from furthest stump has also been considered as the type of shot required to hit the ball directly behind a player is uncommon and the occasional "top edge" shot resulting in this trajectory will be most likely not travel the full distance. The distance from the furthest stump will be circa 76 m. At this distance a good level of protection for a community cricket club will be provided. Only those shots calculated on professional 1st class international players may be capable of surpassing a distance of 76 m, which is considered unlikely or very rare at community level.

Conclusions and Recommendations

The existing mitigation along the North boundary of the recreation ground is a 1.8 m high fence. Based on the height calculations of the ball trajectory combined with the experiential information regarding shot scenario, direction of play and site specifics it is recommended the existing mitigation is suitable for the proposed development. Mitigation to 1.8 m high will protect the development and occupants from horizontal trajectories and low level balls surpassing the boundary. This may not stop all shots from landing in the area but it is believed from the assessment of ball trajectory it will significantly reduce their frequency. Alternatively, increasing the height of mitigation up to 3 m high will further reduce the risk.

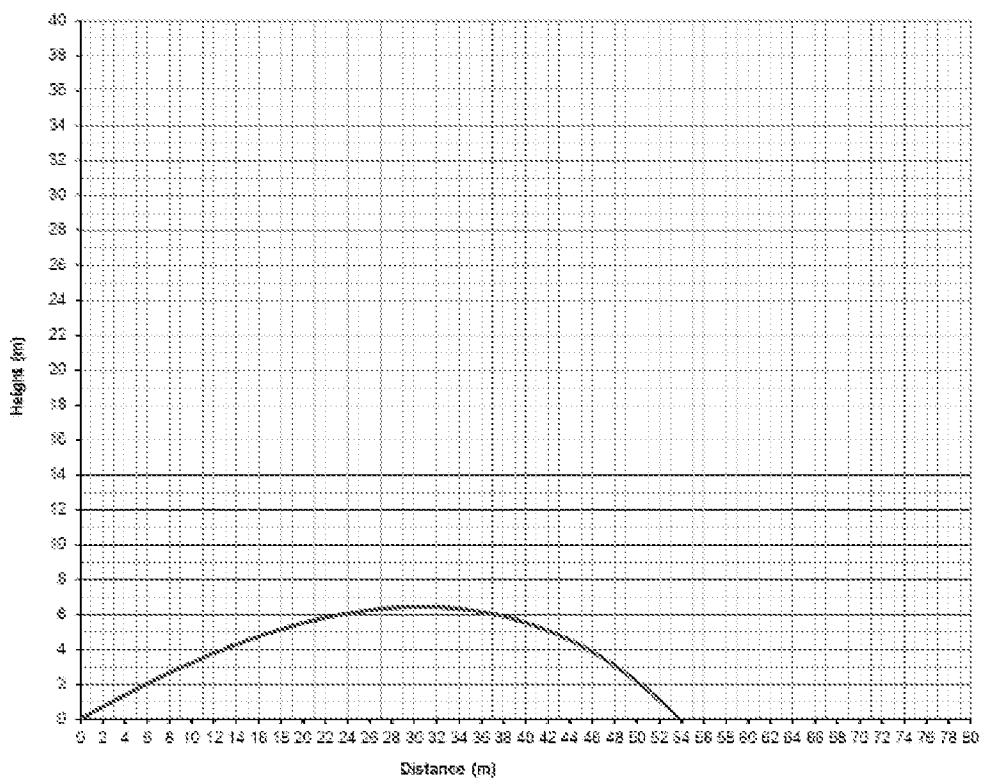
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Further notes:

It is recommended the client discuss the plan with the England and Wales Cricket Board (ECB) or other relevant organisations such as Sport England along with the club to ensure whatever system if proposed is both suitable in mitigating the risk but also practicable for the cricket club's day to day use.

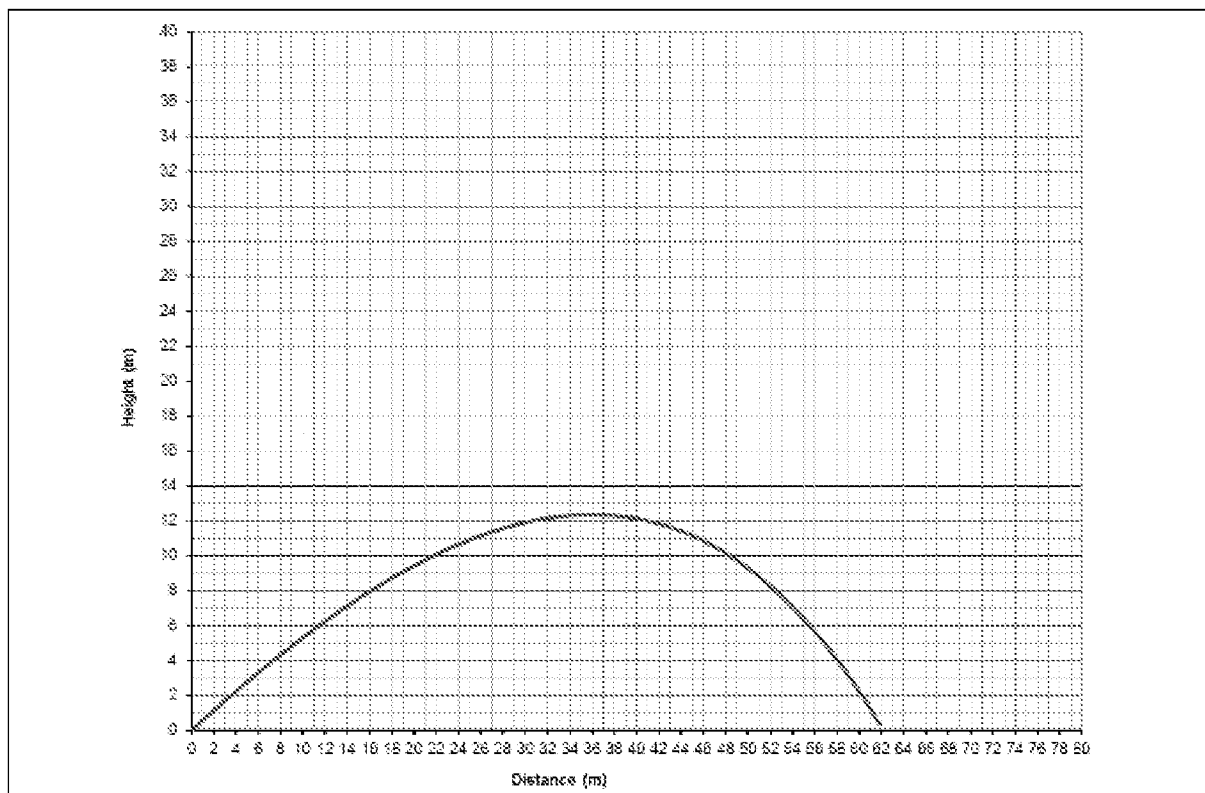
APPENDIX A – EXAMPLE TRAJECTORIES

20 ° @ 40 m/s

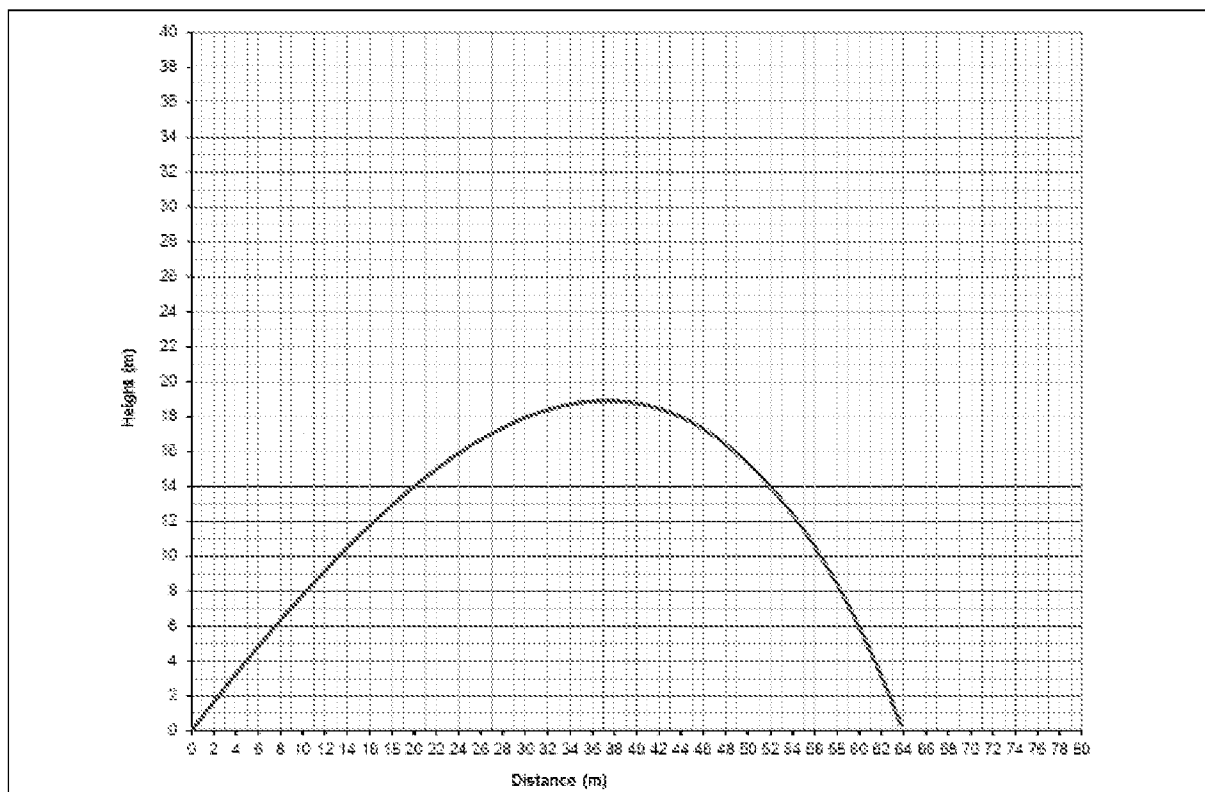


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30 ° @ 40 m/s



40 ° @ 40 m/s



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